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IN THE

Supreme Court of the United States

OCTOBER TERM, 1975.

No. 75-8631

CHICAGO RAWHIDE MANUFACTURING COMPANY,
Petitioner,

vs.

CRANE PACKING COMPANY,
Respondent.

MOTION TO EXPEDITE CONSIDERATION OF PETITION AND TO CONSOLIDATE CASES ON APPEAL.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

JAMES M. WETZEL,
JAMES T. FITZGIBBON,
WETZEL, GREENAWALT & FITZGIBBON,
135 South LaSalle Street,
Chicago, Illinois 60603,
(312) 372-1655,
Attorneys for Petitioner.

Gunthorp-Warren Printing Company, Chicago • Financial 6-6565

TABLE OF CONTENTS.

	PAGE
Table of Authorities	ii
Cases	ii
Statutes	ii
Opinions Below	1
Jurisdiction	2
Questions Presented	2
Statutes Involved	3
Statement of the Case	3
The Background of the Invention	4
The Invention	5
The Decisions In Error	6
The Courts' Lack of Evidence	7
Reasons for Granting the Writ	8
I. The Court of Appeals Decision Conflicts With 35 U. S. C. 103 Because It Wrongfully Employs a Non-Statutory Standard of Non-Obviousness for "Combination" Patents	9
A. A "Combination" Patent Is no Different from Any Other Patent	9
B. Although Unusual Results May Indicate Invention, the Test Under 35 U. S. C. 103 Is Not That of Unusual Results	10
II. The Courts Below Erred by Misinterpreting 35 U. S. C. 103 to Require Only That the Differences Be Found in the Prior Art	12
A. The District Court Made a Basic Error of Law	12
B. The Court of Appeals Repeated This Error.	13
Conclusion	13

TABLE OF AUTHORITIES.

Cases.

Anderson's-Black Rock, Inc. v. Pavement Salvage Co., 395 U. S. 57 (1969) 8, 11

Calmar Inc. et al. v. Cook Chemical, 383 U. S. 1 (1966) . 2, 11

Graham v. John Deere Co., 383 U. S. 1 (1966) 2, 8, 9, 10, 11, 12, 14

Great Atlantic & Pacific Tea Co. v. Supermarket Equp. Co., 340 U. S. 147 (1950) 8, 10, 11

United States v. Adams, 383 U. S. 39 (1966) 2, 8, 11

Statutes of the United States.

28 U. S. C. 1254(1) 2

28 U. S. C. 1338(a) 3

35 U. S. C. 102 ..... 9, 10

35 U. S. C. 103 ..... 2, 3, 7, 9, 10, 11, 12, 14

35 U. S. C. 282 3

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CRANE PACKING COMPANY,
Respondent.

MOTION TO EXPEDITE CONSIDERATION OF PETITION AND TO CONSOLIDATE CASES ON APPEAL.

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

Chicago Rawhide Manufacturing Company, the petitioner herein, respectfully moves the Court to expedite consideration of the petition for a writ of certiorari attached hereto, and upon granting the petition, to enter an order consolidating the case with:

Sakraida v. *Ag Pro Inc.*, No. 75-110, presently pending in this Court.

In support of the motion, the petitioner states as follows:

1. The present case, like the *Sakraida* case, is a patent action.

2. Both cases involve substantially the same issue of law, namely the standard applicable to the determination of the

validity of a patent on the basis of non-obviousness and, more specifically, whether Section 103, Title 35 United States Code, sets a single statutory standard for non-obviousness applicable to all patents, or whether there is a determinable class of "combination" patents to which a special non-statutory rule of law applies.

3. Both cases involve a patent on a combination of elements, the combination of which was new, and both cases require a determination as to whether such a patent can be upheld as valid even though each of the elements in the combination is old and can be found in the prior art.

In contrast to the identity in the issues of law presented by the two cases, there is striking difference in the decisions and in the factual backgrounds of the two cases. Specifically, the determinations on validity are opposite, and although both patents are mechanical patents, the quality of the inventions involved in each is readily distinguishable. Accordingly, it is evident that this case presents a contrasting factual background that lends depth and perspective to the issues presented by the *Sakraida* case, and that the two cases, taken together, will bring into sharper focus the important issues of law that must be considered and decided by this Court.

In view of the foregoing and for the reasons set forth in the petition submitted herewith, it is respectfully urged that the petition be given expedited consideration and that upon granting of that petition, the Court enter an appropriate order of consolidation with the *Sakraida* case.

Respectfully submitted,

JAMES M. WETZEL,
JAMES T. FITZGIBBON,
WETZEL, GREENAWALT &
FITZGIBBON,
135 South LaSalle Street,
Chicago, Illinois 60603,
(312) 372-1655,
Attorneys for Petitioner.

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Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

Petitioner respectfully prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the Seventh Circuit in this case.

OPINIONS BELOW.

The opinion of the Court of Appeals, which is reported at 523 F. 2d 452 (1975), is set forth in the Appendix at pages 1-15. The first opinion of the District Court, dated April 29, 1974, which has not been reported, is set forth in the Appendix at pages 17-63 and the second opinion of the District Court, dated June 21, 1974, which also has not been reported, is set forth in the Appendix at pages 64-71.[1]

---

1. Hereinafter, references to the Appendix are designated as "App." with a page number; Chicago Rawhide is referred to as "Rawhide" or "petitioner", and Crane Packing is referred to as "Crane" or "respondent".

JURISDICTION.

The judgment of the Court of Appeals was entered on September 30, 1975 (App. 1) and a petition for rehearing was denied on November 4, 1975 (App. 16). The jurisdiction of the Court is based on 28 U. S. C. Section 1254(1).

QUESTIONS PRESENTED.

1. Whether the statutory standard for validity on non-obviousness as set forth in Section 103, Title 35 United States Code and as delineated in 1966 by this Court in *"The Trilogy"* of cases,[2] shall apply to all types of patents including "combination" patents?

2. Whether a new and useful combination of elements can be non-obvious and patentable, even though each of the elements in the combination is old?

3. Whether the Court of Appeals erred in adjudging a claimed combination as obvious over prior art where:

   (a) the prior art was no different from that considered by the Patent Office;

   (b) the differences between the patented subject matter and the prior art were "not insubstantial";

   (c) the Court acknowledged that the patented subject matter constituted an "advance in the art"; and,

   (d) there was uncontroverted evidence of commercial success and failure of others.

---

2. *Graham* v. *John Deere Co.*, 383 U. S. 1 (1966); *Calmar, Inc., et al.* v. *Cook Chemical Co.*, 383 U. S. 1 (1966); *United States* v. *Adams*, 383 U. S. 39 (1966).

STATUTES INVOLVED.

The statute involved is Title 35 United States Code, Section 103, which reads as follows:

> "§ 103. *Conditions for Patentability; non-obvious subject matter.*
>
> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title,
> if the differences between the subject matter sought to be patented and the prior art
> are such that
> the subject matter
> as a whole
> would have been obvious at the time the invention was made to a person having ordinary skill in
> the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made."

An ancillary statute involved is that portion of Section 282, Title 35 U. S. C., which states: "A patent shall be presumed valid."

STATEMENT OF THE CASE.

This is a patent case. Jurisdiction is bestowed on the United States District Courts pursuant to 28 U. S. C. 1338(a).

The petitioner, Rawhide, is an Illinois corporation having its principal place of business at Elgin, Illinois; the respondent, Crane, is an Illinois corporation having its principal place of business at Morton Grove, Illinois. Both are engaged in the business of manufacturing and selling rotary mechanical seals and have been for many years.

The petitioner is the owner of the United States Letters Patent No. 3,241,843 issued on March 22, 1966, relating to rotary mechanical seals and entitled "Combined Ring and

Frusto-Conical Member Seal Assembly"[3] which the respondent was charged with infringing.[4] The District Court[5] found the patent to be invalid as obvious (App. 52) but also found the patent to be infringed by the respondent's mechanical seal, if valid (App. 63). The Court of Appeals affirmed (App. 15).

The purpose of this petition for a writ of certiorari is to seek review of the Court's mistake of law on obviousness, from which mistake a very highly regarded patent was found to be invalid.

The Background of the Invention.

Rotary mechanical seals are a type of oil seal which have many applications, one of which is in crawler tractors having track rollers that rotate about a stationary shaft. Because the relatively moving roller and shaft need lubrication, the rotary seal provides a leak proof barrier which keeps the oil in and the dirt out.

In 1961, when the patented Hatch seal was developed, rotary seals in common use were very complex and were made up generally of

a sealing ring,

a mating ring,

a spring to apply an axial pressure so as to maintain the sealing ring in "end face" engagement with the mating surface,

interlocking lugs to transmit a radial driving torque to the sealing ring, and

a molded rubber secondary seal diaphragm to protect the spring and lugs from outside dirt (see App. 2).

In 1959, Caterpillar Tractor Company invented a simpler seal called the Duo Cone. The Duo Cone required neither a

3. The patent is reproduced in the Appendix at pages 72-80.

4. Hereinafter, the seal of the patent is referred to as the "Hatch seal" and the accused infringing seal as the "Crane seal".

5. The Honorable Richard W. McLaren, Judge, presided.

spring to apply pressure to the sealing ring in an axial direction, nor interlocking lugs to attach the ring to the shaft. Instead, Caterpillar shaped the back of the sealing ring more or less like a sloping horizontal "V" ramp to receive a doughnut shaped rubber ring (a "torus") in such a way that pressure against the rubber ring would cause the torus to roll up the ramp and simultaneously to apply an axial force to push the rings together and also a radial force affixing the sealing ring to the shaft and the mating ring to the housing.[6] The separate parts which previously formed an axial spring, a radial interlock, and a secondary seal, were all replaced by the rubber torus and horizontal "V" ramp in the metal ring (App. 3). The Caterpillar Duo Cone seal was disclosed in a French Patent No. 1,255,283 published in January of 1961 and subsequently patented in the United States in a corresponding *Kupfert* United States Patent No. 3,073,189.

The Invention.

The Hatch seal, invented in 1961, was an improvement on the Duo Cone seal using the generic combination of a metal ring and a rubber ring, but a new combination in which the metal ring (instead of having a horizontal "V" ramp), contained a right angle seat and in which the rubber ring (instead of being a torus) was an upright "Belleville" washer which slanted and was shaped in cross-section like a parallelogram (App. 72, Fig. 3). Pressure against the rubber ring of the Hatch seal didn't make it roll as did the Duo Cone torus, but rather tended to make it "go to a vertical position" (App. 63). In other words, instead of the round rubber torus and specially cast, inclined "V" ramp of the Duo Cone, Hatch used a rubber Belleville washer and a simple right angle seat.

Hence, in terms of "combinations" and "elements", it is true that the Hatch seal was a new combination of a rubber

6. The Duo Cone seal is illustrated by the respondent's drawing, page 2 of trial exhibit PX 52, which is reproduced in the Appendix at page 81.

ring (Belleville washer) and a metal ring (with a right angle seat); it is also true that a combination of a rubber ring (torus) and a metal ring (with a horizontal "V" ramp) had been previously used in the Duo Cone; it is also true that the prior art showed individually the elements of Belleville washers and of metal rings with right angle seats. But nowhere did the prior art suggest making the new combination which comprised a Belleville washer and a right angle seat metal ring instead of the old combination of a torus and a horizontal "V" ramp metal ring. That new combination had to be invented and the issue was whether that unsuggested act of invention was obvious or non-obvious.

The improvements that the Hatch seal wrought were highly significant, for the Court below found that an especially attractive feature of the Hatch seal was its ease of installation (App. 11) and that the Hatch seal was more useful and more salable than the Duo Cone (App. 12). The Court below frankly acknowledged respect for the plaintiff's advance in the art (App. 13).

Also, it was an uncontroverted fact in this case that the Hatch seal has enjoyed a commercial success which has been untouched by the Duo Cone, even today (App. 6), and that the respondent's infringing Crane seal was the compulsive result of its miserable failure to design around the Hatch seal (App. 70). The high regard and respect the industry showed for the Hatch seal were certainly well earned.

The Decisions in Error.

However, the Court of Appeals affirmed that the patent was found to be invalid because "the basic elements of the Hatch device were disclosed by the prior art" (App. 5). The District Court mistakenly had decided that it could invalidate just because the acknowledged differences between the Duo Cone seal and the Hatch seal could be found somewhere in

a montage of the prior art. The Court of Appeals sought to repair that error in the opinion of the District Court.

A counterplay of contradictory statements resulted: (a) the Appeal Court painted with a broad brush stating that "[t]he concept . . . of a rubber ring and a metal sealing ring . . . was revealed by Duo Cone" (App. 5), but the District Court had already contra-explained that the differences between the Duo Cone seal and Hatch seal were "not insubstantial" (App. 48); and (b) the Appeal Court added a new finding of fact that "[c]ombinations of a metal ring . . . with a rubber washer shaped like the one used by Hatch had been used . . . before" (App. 5), but that was incorrect because the District Court had already stated that not one of those uses anticipated (App. 53-56) and although the basic elements were not new, they were united in the Hatch seal in a "different fashion" (App. 50).

Hence, rather than change, the Court of Appeals adopted the decision of the District Court and the two courts decided that the Hatch seal was a "new combination" but of "old elements" and was invalid under 35 U. S. C. 103 on the incorrect, simplistic formula that *"the claimed differences* between the Duo Cone seal and the Hatch seal *could be found in the prior art"* (App. 68) (Emphasis added).

With regard to the prior art, the art which the Court relied upon to invalidate was the very prior art, or less pertinent than the prior art (App. 48), over which the Patent Office granted the patent. Significantly, the "Payne patent", frequently referred to in the record, was not sufficiently significant to have been included in the art relied upon by the District Court for invalidating the patent.

The Courts' Lack of Evidence.

The presumption of validity which attaches to a patent was summarily swept aside by the Court's pronouncement that the District Court had found invalidity based upon a "clear and

convincing showing" (App. 10). What constituted that "clear and convincing" evidence was never in the record, and though questioned, was never revealed by the District Court, and was never pointed to by the Appeal Court; presumably it was the prior art. Because the prior art before the Patent Office and the Court was the same, the "clear and convincing showing" was apparently the same clear and convincing showing which had moved the Patent Office Examiner to grant the patent in the first instance and had permitted the presumption of validity to attach. If so, it follows that the "clear and convincing showing" referred to by the Court, was actually non-existent, let alone being sufficient to overcome the presumption.

REASONS FOR GRANTING THE WRIT.

The Court has already granted a Writ of Certiorari in *Sakraida* v. *Ag Pro*, No. 75-110, to consider the matter of non-obviousness in "combination" patents. Unfortunately, the *Sakraida* case falls into the class of barnyard implements and technical trivia that the Supreme Court has usually reviewed in connection with that issue.[7] The rotary seal technology involved here is sufficiently imaginative and demanding as to give a balancing technical perspective to the Court's considerations in this case, in the same manner that *U. S.* v. *Adams, supra*, with its more sophisticated subject matter, contributed to the sound opinion in *Graham* v. *John Deere, supra*. For that reason, and because the issue involved is non-obviousness in a combination patent, the writ of certiorari should be granted.

An equally compelling reason for granting the writ of certiorari, still related to the *Sakraida* case, is the underlying inquiry and question of whether, on the issue of validity based on non-obviousness, there is a separate class of "combination patents"

7. a wooden frame—*Great Atlantic & Pacific Tea Co.* v. *Supermarket Equip. Corp.*, 340 U. S. 147 (1950);
a plow tine—*Graham* v. *John Deere*, 383 U. S. 1 (1966);
a blowtorch—*Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co.*, 396 U. S. 57 (1969).

and specifically whether 35 U. S. C. 103 sets a single statutory standard for non-obviousness that applies equally to all patents. It is the "combination patent" aspect which is attacked with redundance in the *Sakraida* case and which the Appeal Court emphasized in this case.

In fact, the appellation "combination patent" has no separate statutory status in the patent laws, and, specifically, none in regard to the issue of validity. If ever it had a separate status, that status disappeared with the 1952 Patent Act. The writ should be granted to permit an affirmation of the fact that, at law, the test for validity under U. S. C. Section 103 is the same for all patents.

Finally, the writ should be granted to review the decision in error of the Court of Appeals that, under the standard of 35 U. S. C. 103, a patent is invalid on the ground of obviousness if the differences between the patented subject matter and some of the prior art could be found in any other of the prior art. That is what the District Court said in explanation of its decision (App. 68) and that is what the Court of Appeals affirmed. That misstatement of the law needs to be corrected, for it is contrary to the standard of 35 U. S. C. 103, particularly as explained by this Court in *Graham* v. *John Deere*.

I. The Court of Appeals Decision Conflicts with 35 U. S. C. 103 Because It Wrongfully Employs a Non-Statutory Standard of Non-Obviousness for "Combination" Patents.

A. A "Combination" Patent Is No Different from Any Other Patent.

In affirming the District Court, the Court of Appeals emphasized that the decision concerned a "combination patent". The flaw in that designation is that almost all inventions are to combinations of elements, generally all old elements. And that is true, whether the combination considered is in the mechanical, electrical or chemical arts. If the combination considered is an old combination, then it is anticipated under 35

U. S. C. 102, but if the combination considered is a new combination, then the standard for testing its validity is non-obviousness under 35 U. S. C. 103. It is fair to say that Section 103 is directed primarily, although not exclusively, to patents involving combinations of elements.

Hence, in the converse, where validity is being tested, and where the test that has been applied is non-obviousness, the invention being tested is likely to be a new combination, and probably a combination of old elements. Where the subject is a new combination, then in ascertaining the "differences between the prior art and the claims at issue" as required by *Graham* v. *John Deere Co.* (*supra* at 17), it is likely that: (a) the prior art, taken individually, will not show the claimed device; and (b) the prior art, taken collectively, will show all of the elements (and probably more) of the claimed device. Those are truisms which the District Court determined for itself in this case. But the discovery of those truisms is not the end, as the Court mistakenly decided in this case, but rather the beginning for determining the presence or absence of non-obviousness.

B. Although Unusual Results May Indicate Invention, the Test Under 35 U. S. C. 103 Is Not That of Unusual Results.

The confusion with regard to the law on new combinations of old elements arose out of the *A&P* decision, *supra*. There, the Court spoke of the "difficulty and improbability of finding invention in an assembly of old elements" and said that the whole must in some way exceed the sum of the parts and produce an "unusual or surprising consequence" (*supra* at 152). It suggested a different standard for validity between combination patents and "other" patents.

Section 103 of the 1952 Patent Act sought to reunify the test for validity from one requiring segregation of combination patents and a finding of unusual results, to one requiring only a determination that the claimed subject matter would have been

non-obvious at the time the invention was made to a person having ordinary skill in the art. According to the decisions and opinions in *The Trilogy*,[8] Section 103 had effected that purpose. However, it is questioned whether that affirmation was carried through in the *Anderson's-Black Rock* case, *supra*, f. n. 7.

In *Black Rock*, the Court did refer to the "obvious-non-obviousness standard", but it also pointed out that a combination may result in an effect greater than the sum of the several separate effects and noted that no such "synergistic result" had been argued. The Court found that "the use of old elements in combination was not an invention" (*supra* at 62). Obviously, the opinion is open to interpretation as to whether it was a decision genuinely under Section 103 or a redressed version of the pre-1952 *A&P* standard where combination patents were segregated and then tested for unusual (synergistic) results.

None of this is to say that the decisions of invalidity in *A&P* and *Black Rock* were not correct. The patents were invalid; but they were invalid because the subject matter of each of the patents was manifestly obvious. Although factually true, it should have been only incidental to these decisions that the combinations claimed in these patents failed to produce unusual results.

In testing the validity of the patent in the *Sakraida* case, as well as the present case, great caution must be exercised against segregating a patent as a combination and against applying non-statutory test of looking for unusual results. Unusual results are nice and may be "indicia of obviousness or non-obviousness"[9]; but the statute says, and the test is, "non-obviousness".

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8. See footnote 2.
9. *Graham* v. *Deere*, *supra* at 18.

II. The Courts Below Erred by Misinterpreting 35 U. S. C. 103 to Require Only That the Differences Be Found in the Prior Art.

A. The District Court Made a Basic Error of Law.

The District Court's first opinion was incongruous because the Court found that the patented subject matter was not shown in any of the prior art and that, as a matter of fact, the differences between the claimed Hatch seal and the closest prior art teaching (the Duo Cone seal) were "not insubstantial" (App. 48). That determination was in conformity with the standard of 35 U. S. C. 103, as applied in *Graham* v. *Deere*. It was a leg-up in an affirmation of the Patent Office determination of non-obviousness.

The Court also made the determination that the basic elements in the Hatch seal were not new and individually were revealed in the prior art. But along with that, the Court did recognize that in Hatch those old elements were combined "in a slightly different fashion". Normally, the sum of those comments would be another leg-up in the affirmation of the Patent Office determination of non-obviousness.

But instead, the District Court then rushed its way through a determination of the level of ordinary skill, brushed aside the secondary considerations of commercial success and failure of others, and embraced the decision that the patent was "invalid by reason of its obviousness" (App. 52).

Because of the startling nature of that decision, and because it did not appear to be a rational conclusion, the District Court was asked to reconsider. The Court did reconsider. In reconsidering, the Court did not change its decision, nor did it make its conclusion rational. Rather, the Court displayed and gave explanation to its error. The Court stated:

> "*Because the claimed differences* between the Duo Cone seal and Hatch seal *could be found in the prior art*, the Court found the patent invalid on the ground of obviousness." (App. 68) (Emphasis added.)

The District Court could not have been more candid, nor more wrong. That statement also explained why the Court had rushed through the step of determining the level of ordinary skill and brushed aside secondary considerations. Obviously, according to the Court's misunderstanding, if all of the differences could be found in the prior art, a conclusion of invalidity was forgone and it made little difference as to what the level of ordinary skill or the secondary considerations might be.

B. The Court of Appeals Repeated This Error.

Upon appeal, the Court of Appeals detected the flaw in this logic, and sought to repair the deficiency by adding a new finding of fact, stating:

> "Combinations of a metal ring containing an angled rear seat with a rubber washer shaped like the one used by Hatch had been used on more than one occasion before." (App. 5.)[10]

and affirmed the District Court's conclusion of invalidity based on obviousness.

It is the Court of Appeals' affirmation of the District Court's error in law that is sought to be reviewed here. Specifically, it is incorrect under the law for the Court of Appeals to have affirmed that a patent is invalid on the ground of obviousness because all of the differences between the subject matter claimed and the prior art could be found in the prior art.

CONCLUSION.

The petitioner's highly respected patent has been mistakenly found to be invalid for obviousness on an error in applying the law. That error arose out of incorrectly segregating the patent into a class of "combination patents" (which has no statutory meaning from the standpoint of validity) and then invalidating

10. This finding is incorrect and contrary to the decision of the District Court. See page 7 of this brief.

the patent because the elements of the combination could be found in the prior art. Section 103 of 35 U. S. C. and this Court in *Graham* v. *John Deere, supra,* say that the test is different.

There is now before the Court on a writ of certiorari the case of *Sakraida* v. *Ag Pro* which raises the same issue of validity based on non-obviousness of a patent which has been segregated as a "combination patent". Review of this case will not only present the opportunity for correcting the errors of Court below, but will lend proper perspective to the important issues of law presented by both cases.

For the foregoing reasons, this Court should issue a writ of certiorari to review the opinion and judgment of the United States Court of Appeals for the Seventh Circuit.

Respectfully submitted,

JAMES M. WETZEL,
JAMES T. FITZGIBBON,
WETZEL, GREENAWALT &
FITZGIBBON,
135 South LaSalle Street,
Chicago, Illinois 60603,
(312) 372-1655,
Attorneys for Petitioner.

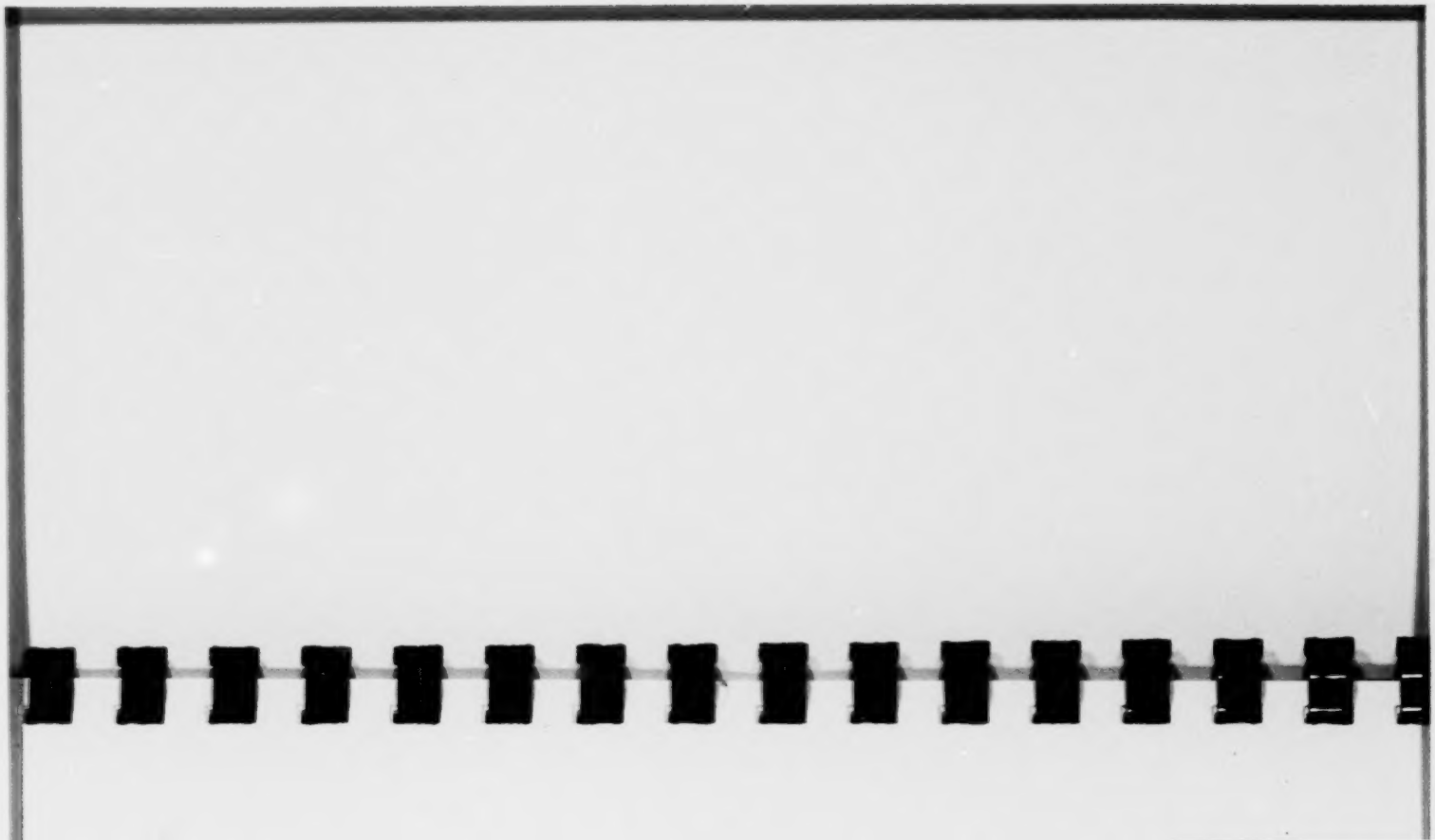


TABLE OF CONTENTS OF APPENDIX

PAGE

Opinion Of The Court Below 1

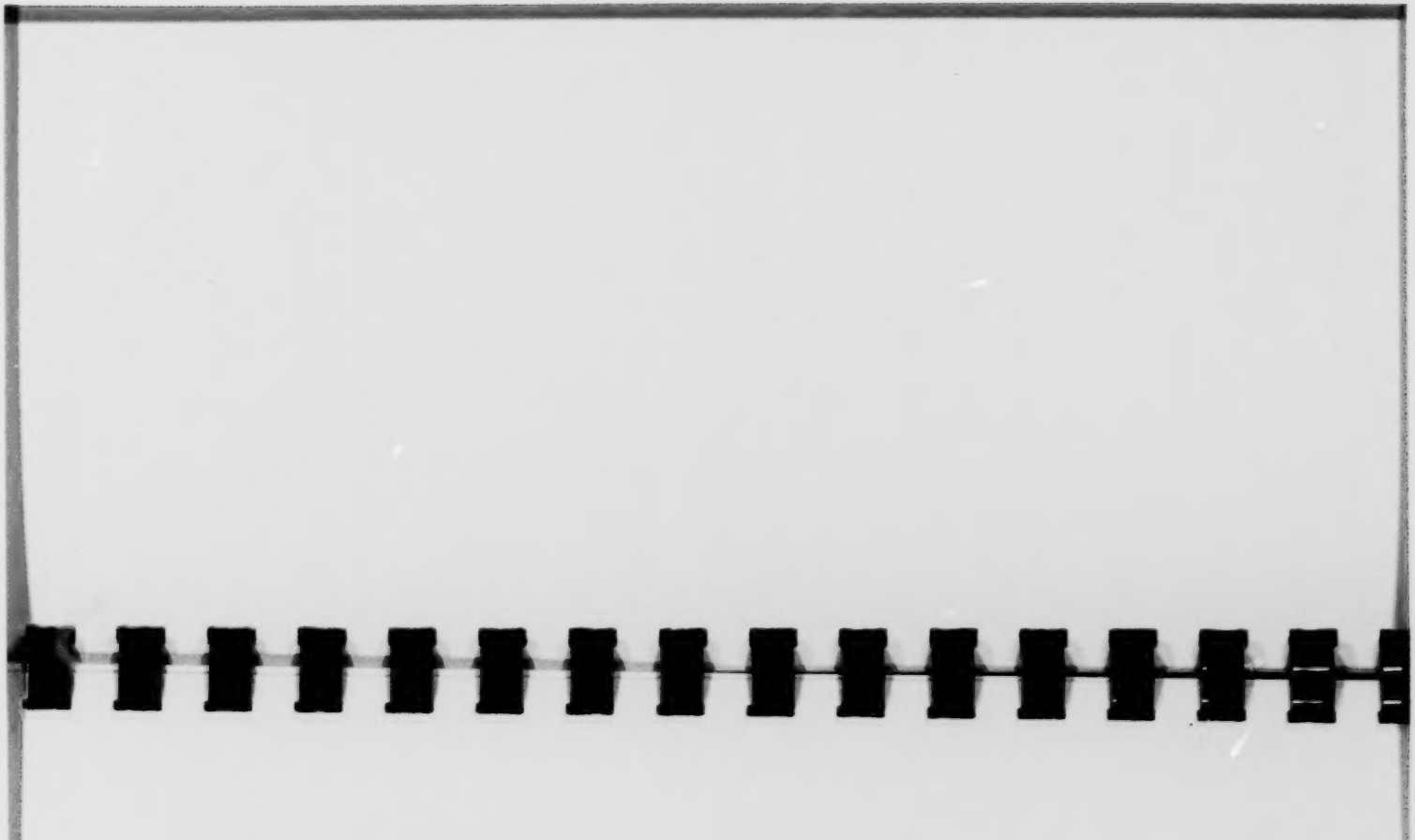
Order Denying Petition For Rehearing 16

First Opinion And Order Of the District Court... 17

Second Opinion And Order Of The District Court.. 64

Plaintiff's Hatch et al Patent No. 3,241,843.... 72

Drawing Of Prior Art Duo Cone Seal..... 81



In the
United States Court of Appeals
For the Seventh Circuit

Nos. 74-1714, 74-1715

CHICAGO RAWHIDE MANUFACTURING CO.,

Plaintiff-Appellant,

vs.

CRANE PACKING CO.,

Defendant-Appellee

Appeal from the United States District Court for the Northern District of Illinois, Eastern Division
No. 72 C 658
RICHARD W. McLAREN, *Judge*

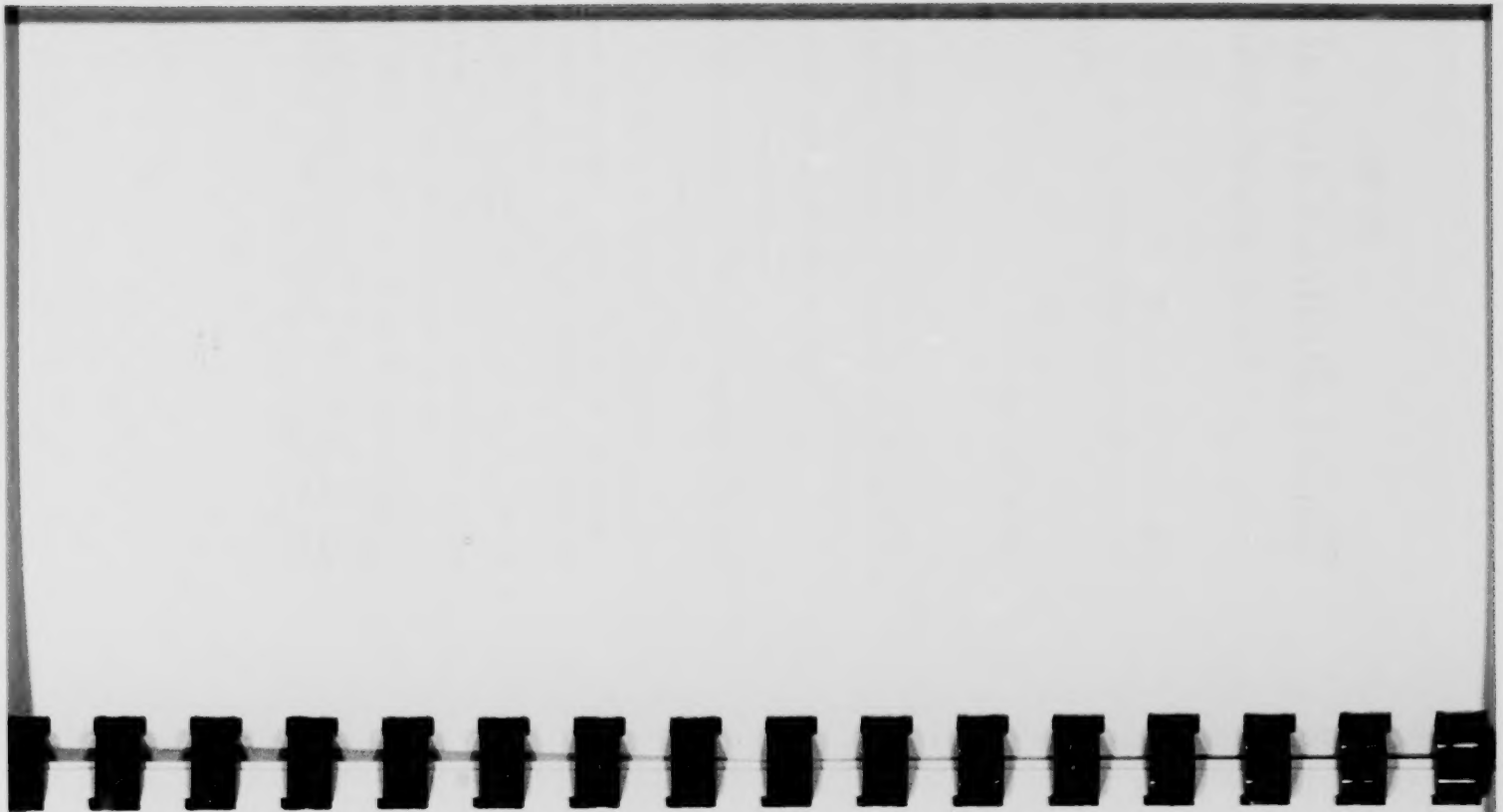
ARGUED FEBRUARY 5, 1975 — DECIDED SEPTEMBER 30, 1975

Before SWYGERT, STEVENS and DOYLE.* *Circuit Judges.*

STEVENS, *Circuit Judge.* Plaintiff, the owner of a combination patent relating to a rotary seal assembly (Hatch '843),[1] appeals from a judgment holding the patent invalid as obvious. Defendant has cross-appealed, claiming that plaintiff's failure, during the prosecution of the patent application, to cite two prior patents described in its own internal memorandum as "the patents of most

* Circuit Judge William E. Doyle of the Tenth Circuit is sitting by designation.

[1] Patent No. 3,241,843 on "Combined Ring and Frusto-Conical Member Seal Assembly," issued on March 22, 1966, to Chicago Rawhide Manufacturing Company as assignee of Hatch, Morley and Blair on an application filed November 29, 1961.



concern," and its use of a misleading affidavit to avoid another prior art reference, made this an exceptional case entitling it to an award of fees. Defendant has raised other issues which we do not reach because we affirm on the issue of validity.

Plaintiff does not challenge any of the findings of fact, arguing instead that the district court misapplied the law, particularly by minimizing the importance of the presumption of patent validity and of the commercial success of the patented seal. Our statement of the case is based largely on those findings and on the text of the patent.

Rotary mechanical seals are used in equipment which contains either a stationary housing through which a rotating shaft extends, or a stationary shaft about which a roller turns. In either situation, the relatively moving parts need lubrication; the rotary seal provides a leak-proof barrier which keeps the lubricant within the machine and dirt and grime out.

Years ago oil seals were nothing more than a lubricating materal called a "packing" crammed in a "stuffing box" which surrounded a shaft. Such packing needed frequent replacement, tended to leak, and was generally unsatisfactory. By 1961, when plaintiff's Hatch device was developed, the rotary seals in common use were more complex. Typically they included four features worthy of separate mention.

(1) The primary seal enclosing the lubricant was affected by engaging a sealing ring (which might rotate with a shaft) with a mating ring or mating surface (which might be affixed to the stationary housing). (2) The sealing ring, and sometimes the mating ring as well, was provided with a spring means which applied pressure in an axial direction — i.e., parallel to the rotating shaft — to maintain the sealing ring in "end face" running engagement with the mating surface. (3) An interlocking means transmitted driving torque to the sealing ring. And finally (4), a secondary seal protected the spring and the interlock from outside dirt. From even this abbreviated

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scription it is evident that such seals required a multi-city of parts.[2]

In 1959, Caterpillar Tractor Company began to use a ch simpler and more durable seal called the Duo Cone. e Duo Cone used neither a spring means to apply pres-re to the sealing ring in an axial direction (or to the ting ring or surface) nor any mechanical interlock to ach the ring to the shaft. Instead, Caterpillar shaped back of the sealing ring (and also the back of the ting ring) more or less like an irregular, horizontal ," to receive a doughnut shaped rubber ring (a "torus") such a way that pressure against the rubber ring would ultaneously apply axial force to push the rings together l also radial force affixing the sealing ring to the shaft l the mating ring to the housing. The separate parts ich previously formed an axial spring, a radial inter-k, and a secondary seal, were all replaced by a simple ber torus which, when compressed, continuously applied requisite force to hold the ring in place.

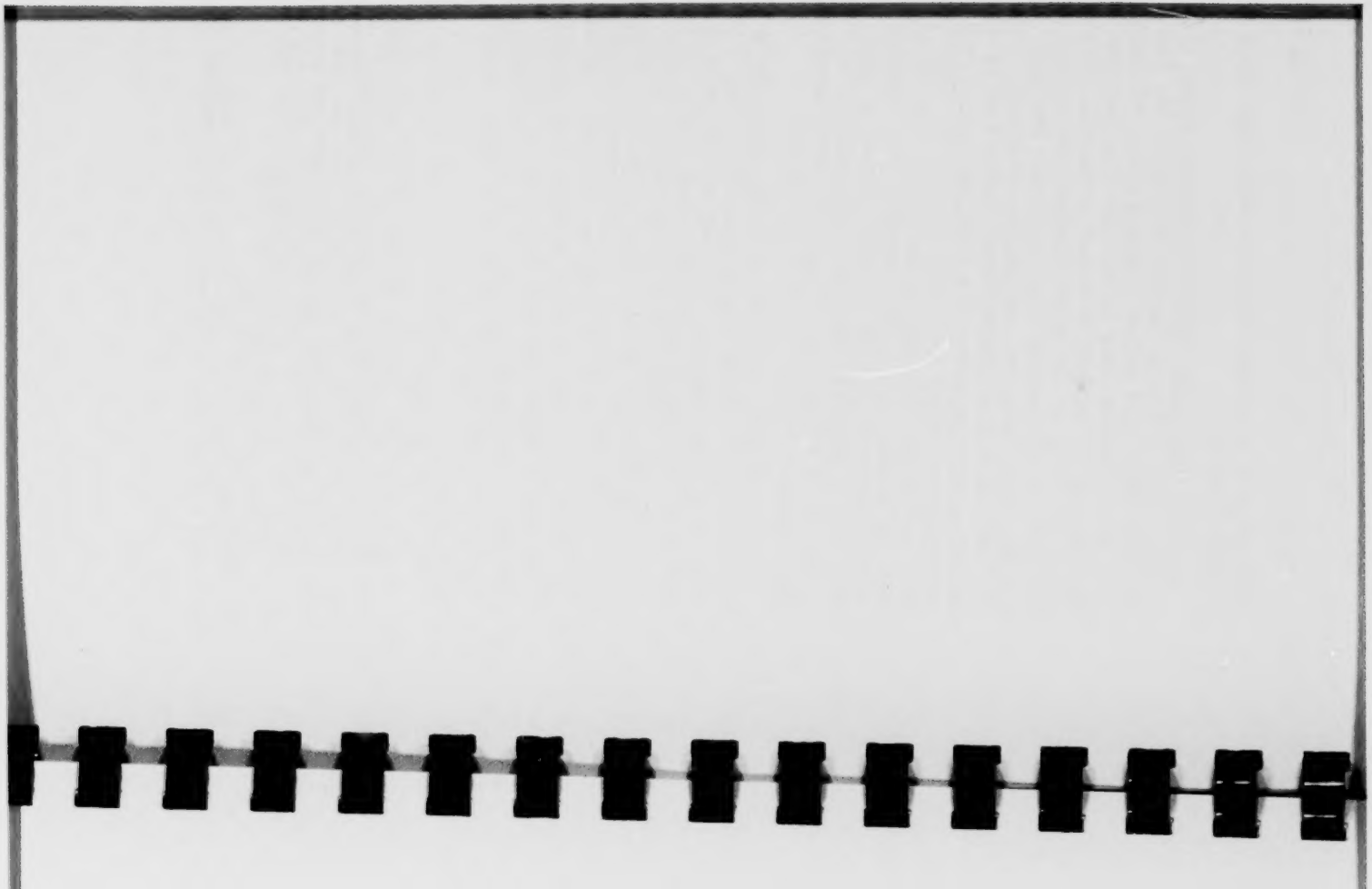
The Hatch seal, invented in 1961, was also a simple mbination of a metal ring and a rubber ring. Unlike the o Cone seal, however, the rear of the metal ring con-ned a right angled seat and a cross section of the rub-r ring was shaped like a parallelogram rather than a cle. Compression of the rubber ring, upon installation, essed the metal ring in an axial direction against its posing radial face to form the primary seal and also ovided the torque to cause rotation. The invention cov-ed both a single face seal including one metal ring and e rubber ring and a double face seal consisting of two ntical seals mounted with their metal rings face to e.[3]

Finding No. 17 reads:

"17. In 1961, when the patentees designed the Hatch device, mechanical seals generally consisted of two metal rings in end face abutting relationship and urged into engagement by an axially directed spring force. Seals of this variety consisted of a multiplicity of parts in addition to the pair of metal end face rings, including springs, washers, gaskets, metal shells, and a rubber sealing diaphragm. They had a relatively short useful life, and were subject to failure if the rubber diaphragm were ruptured. Such rupturing occurred frequently." App. 35-36.

Findings No. 7 and No. 8 read:

"7. The single face seal consists of two parts: a metal ring and a rubber ring (called 'secondary sealing member'). The metal



The specifications in the Hatch patent primarily emphasize the advantages of using the simple rubber ring to perform three entirely different functions previously performed by three different elements in the rotary seals then in common use.[4] Essentially the same advantages were

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[3] Continued)

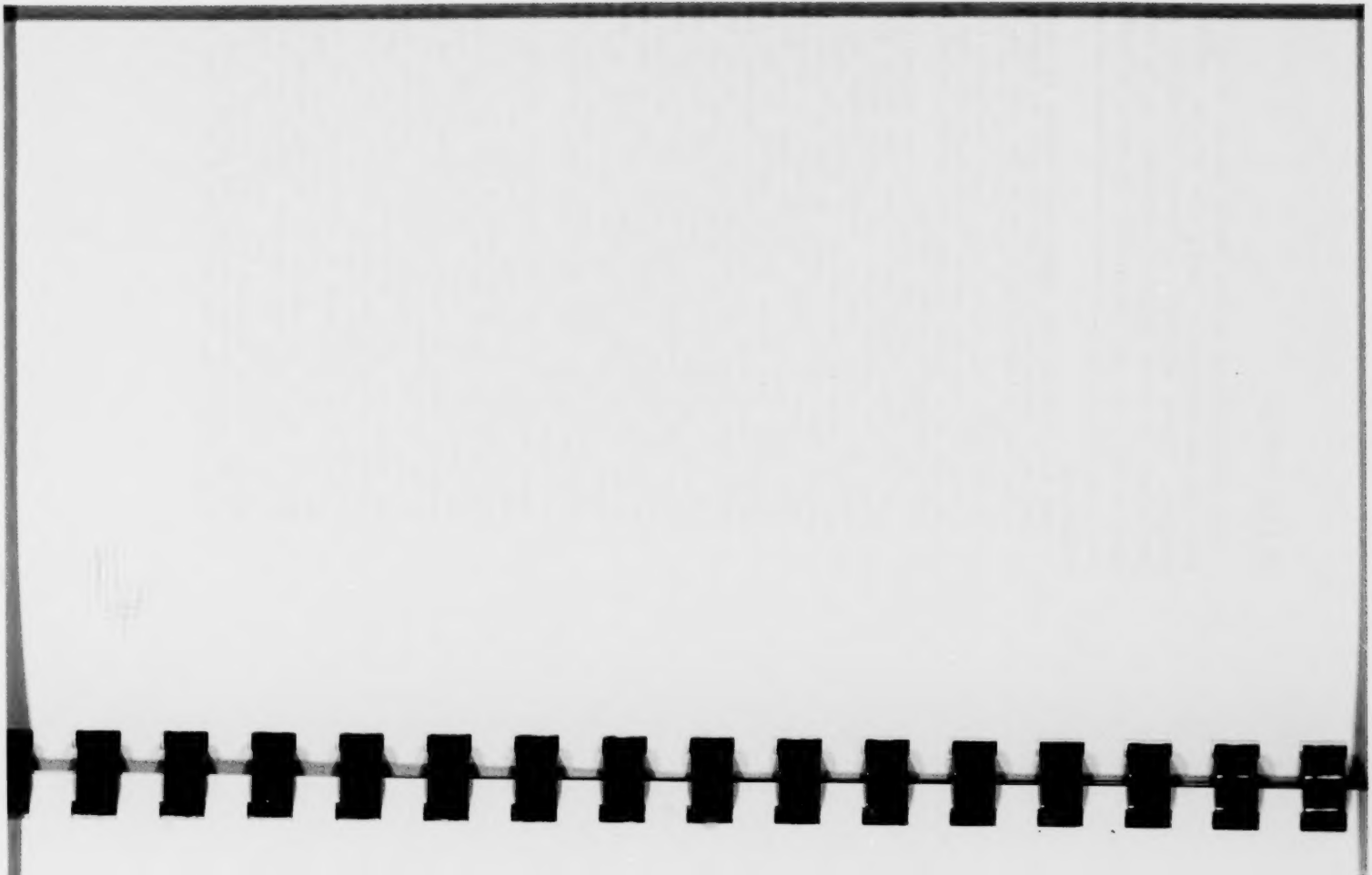
ring has a radial face which bears against an opposing radial face on a housing or other part to form the primary seal. The rubber ring is mounted in a seat on the metal ring. Its opposite end is seated in a wall of the housing or cavity in which the seal is placed. The rubber ring, upon installation, is compressed to press the metal ring against its opposing radial face. The rubber ring acts as a spring to keep the primary sealing faces firmly pressed together to prevent leakage.

"8. The double face seal consists of two identical seals mounted with their metal rings face to face. The second seal takes the place of the opposing radial face against which the single seal bears. The rubber rings are mounted between the metal rings and the walls of the housing or cavity in which the seal is placed. These walls are moved by bolts or screws toward each other to place the rubber under pressure to constantly press the metal rings together. Thus, as the metal rings wear, they are nevertheless kept firmly pressed together by the spring action of the rubber rings. One metal ring is stationary and the other metal ring rotates. The stationary ring is sealed by its rubber ring to a stationary part, either the cavity wall or the shaft extending through it. The rotating metal ring is sealed by its rubber ring to a rotating part, which may be either cavity wall or shaft. The faces of the metal rings form the primary seal. They are pressed together, axially of the shaft, by the spring action of the rubber rings. The rubber rings form a secondary seal between the metal rings and the cavity walls. The rubber rings also provide the torque or force to cause one metal ring to rotate and to hold the other metal ring stationary against rotation." App. 27-28.

[4] "Basic rotary end face seal designs have included a sealing ring engaged with a mating ring or mating surface, the sealing ring being provided with spring means acting in an axial direction and maintaining the sealing ring in end face running engagement with the mating surface, axially adjustable sealing ring interlocking means to transmit driving torque to the sealing ring, and secondary sealing means protecting the spring and interlock arrangement from dirt and the like to maintain efficient functioning thereof. Seals of this design are rather complicated, difficult to install, difficult to maintain, expensive, and often unreliable due to the design and operational complexities involved.

Efforts have been made to improve rotary end face seal operation and design. To a certain extent, these efforts have been directed toward the reduction in the total number of parts necessary in end face seal operation. Sealing and mating rings of special configuration have been combined with specially designed secondary sealing members which are intended to provide requisite end face sealing pressure, sealing ring driving torque, and secondary sealing between the ring and a part of the housing or shaft of the

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achieved by the Duo Cone seal which was described in the patents owned by Caterpillar Tractor Company.[5]

The district court's conclusion that the Hatch invention was obvious was reached after making an accurate and detailed determination of the scope and content of the prior art, considering the differences between that art and the Hatch claims, and concluding that the level of skill in the rotary seal art was "quite high" at the time of the Hatch invention since both plaintiff and defendant were then aware of the advantages of the Duo Cone assembly.

The district court found that the basic elements of the Hatch device were disclosed by the prior art. The concept of a simple juxtaposition of a rubber ring and a metal sealing ring with compression upon installation providing both axial and radial force and also performing the secondary sealing function was revealed by Duo Cone. Combinations of a metal ring containing an angled rear seat with a rubber washer shaped like the one used by Hatch had been used on more than one occasion before.[6] Indeed the rubber ring with a cross section resembling a parallelogram — a frusto-conical shape — had even become known as a "Belleville washer." Based on the prior use of such a washer and a right angled rear seat on a metal ring, together with the simple concept illustrated by Duo Cone, the district judge concluded that the Hatch patent lacked the inventiveness required by § 103; he said that the determination of obviousness was "based on clear and convincing evidence."

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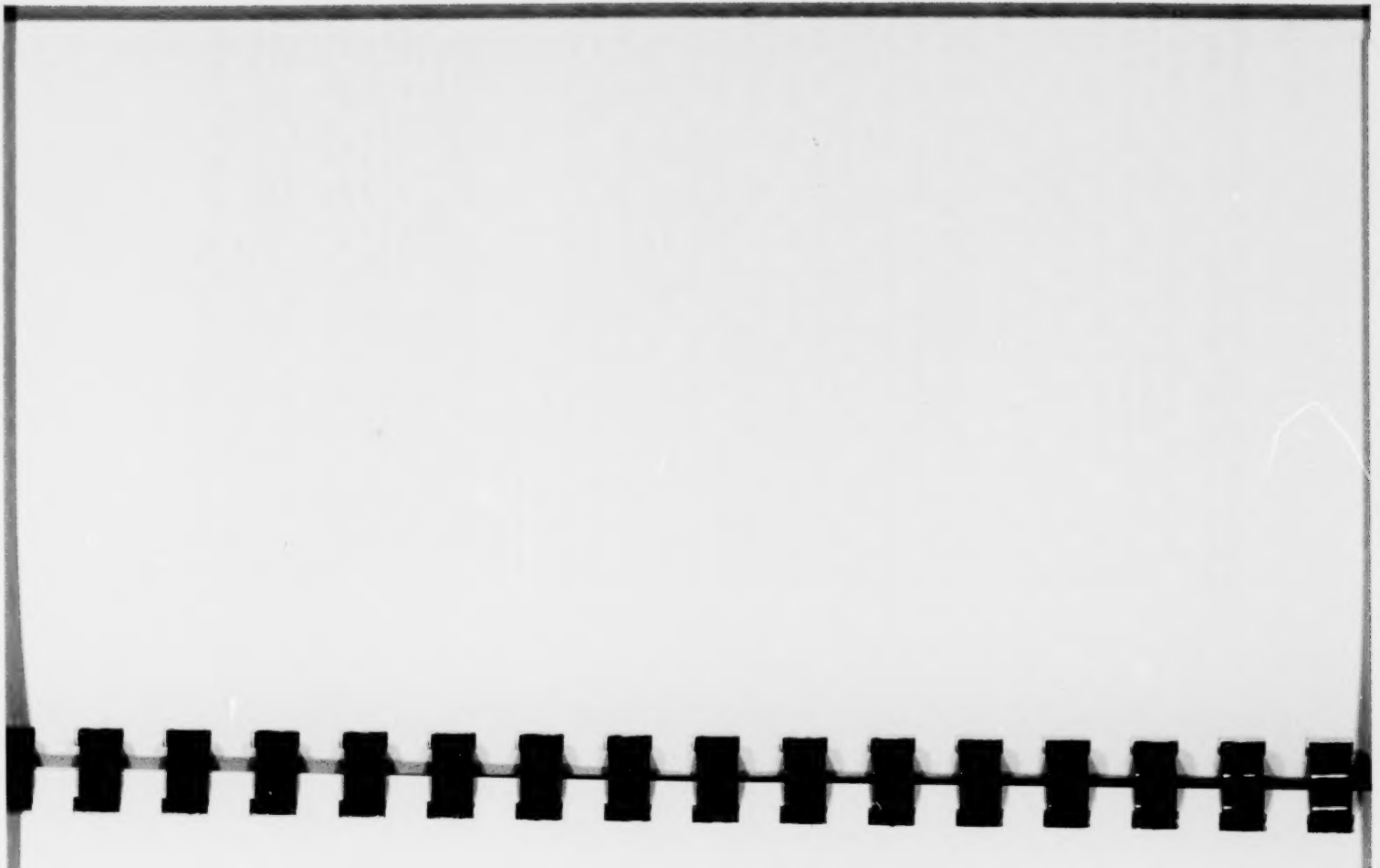
[4] (Continued)

installation. The designs resulting from these efforts still leave much to be desired with regard to operational efficiency, economy in fabrication, and ease of installation. In this respect it has been found exceedingly difficult to combine in a single secondary member the various properties necessary to provide the three main and entirely different functions originally performed by three different elements." Column 1, lines 24-54, of Patent No. 3,241,843.

[5] Kupfert, et al. Patent No. 2,814,513 (Nov. 26, 1957); Kupfert Patent No. 3,180,648 (Apr. 27, 1965); and French Patent No. 1,255,283 (Jan. 23, 1961).

On cross-examination, plaintiff's witness Morley, one of the inventors of the Hatch patent, acknowledged that the rubber torus in the Duo Cone seal accomplished the three essential functions described in the Hatch patent. See Tr. 238-239.

[6] Payne No. 2,855,226 (Fdgs. 23-24); Dardin No. 1,862,887 (Fdg. 27); see also Krug No. 2,289,274 (Fdg. 30).



The Hatch device enjoyed prompt and widespread commercial success. The district court discounted the significance of this success, however, because Caterpillar had refused to grant a license to manufacture the Duo Cone seal, and apparently had limited its use to Caterpillar's own heavy equipment. The district court drew the inference that the demand for the Hatch device would not have been so high if Caterpillar had commercially marketed Duo Cone. Plaintiff criticizes the district court's analysis as inadequately supported by the record and as contradicted by evidence identifying superior features of the Hatch device, particularly its efficient installation.

The district court refused to find plaintiff guilty of fraud on the Patent Office either because of the failure to cite pertinent prior art or because of the somewhat misleading character of an exhibit attached to an affidavit submitted by one of the inventors.

A patent issued in 1958 (Payne '226) taught the use of a mating ring supported upon a frusto-conical member.[7] This was the first patent discussed in detail in the district court's analysis of the prior art.[8] It was one of two patents which one of the inventors of Hatch described, before the Hatch application was filed, as "the patents of most concern." Unquestionably it was relevant prior art, but it was not cited to the Patent Office. Without condoning plaintiff's omission, and after stating that it considered this a "close case," the court declined to find fraud because another somewhat similar Payne patent had been cited and the omission of Payne '226 appeared to be an unintentional isolated act.

Prior to issuance, the Hatch claims had been rejected on the basis of an earlier patent, Krug '274. Krug had disclosed a seal in which compression of "a centrally apertured connecting disc" composed of synthetic rubber material applied axially directed force against a metal sealing ring.[9] In order to avoid the Krug reference, one of the inventors of Hatch prepared an affidavit describ-

[7] Payne No. 2,855,226. App. 65.

[8] See Findings 23-26.

[9] See Patent No. 2,289,274 issued to plaintiff as assignee of Krug on July 7, 1942, column 1, lines 38-39; column 2, lines 26-27; column 3, lines 15-20, lines 53-61.



ing tests comparing the flexibility of the Krug disc and the Hatch frusto-conical washer. An exhibit to that affidavit contained a pictorial representation of the Krug installation which made it appear that the unconfined portion of the rubber disc was significantly greater (and presumably, therefore, more flexible) than it actually was in the test model used by the affiant. However, the actual dimensions of the test device were accurately set forth on the exhibit and a careful examination of the diagram would have revealed its distortion. For this reason, together with a reluctance to infer that the Patent Examiner actually relied on tests of only one device when the Krug patent made it clear that variations in construction would produce variations in actual pressure, the district court refused to find that the affidavit was fraudulent.

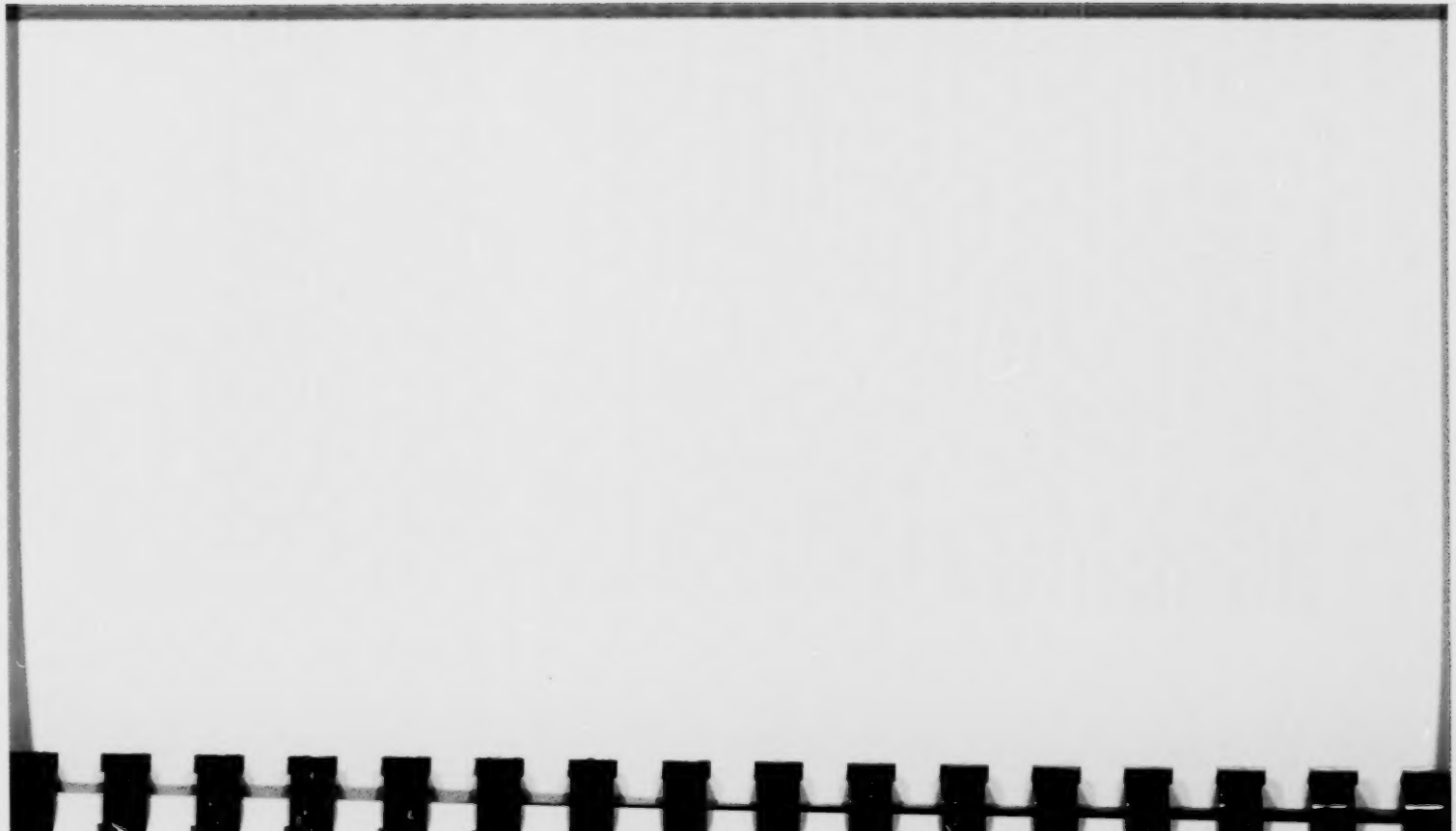
Defendant's accused device was first marketed in 1970. Apparently initial attempts to make a seal using a Duo Cone metal ring and a rubber ring shaped like a doughnut with an axial lip on it failed. Later defendant copied plaintiff's metal ring with a right-angled rear seat and substituted a washer with a cross sectional appearance only slightly different from a parallelogram. Defendant's theory of non-infringement, rejected by the district court, was that plaintiff's claims were limited to the precise parallelogram shape and, further, that pressure on defendant's washer produced more of a rolling action than spring-like compression. In any event, we do not reach the issue of infringement raised by defendant's cross appeal since we accept the district court's analysis on the obviousness issue.

I.

Plaintiff's principal argument is that "the district court erred as a matter of law in failing to heed properly the mandate of the statute 35 U.S.C. § 282[10] that a patent is presumed valid."

[10] Section 282 provides, in part:

"A patent shall be presumed valid. Each claim of a patent (whether in independent or dependent form) shall be presumed valid independently of the validity of other claims; dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting it."



There are four steps in plaintiff's argument that, as a matter of law, the statutory presumption requires that the Hatch patent be accepted as valid. First, plaintiff points out that in this jurisdiction the presumption is "not an idle gesture" and that the burden of overcoming that presumption "rests heavily" upon the person asserting invalidity.[11] The basis for the presumption, according to plaintiff, is the recognition that patent examiners have technical expertise that is entitled to the same deference as determinations by other administrators. Second, plaintiff asserts that the prior art presented to the district court was the same as the prior art considered by the Patent Office, and therefore the presumption is strengthened. Third, plaintiff urges that the presumption is further strengthened by the fact that Patent Office prosecution lasted for over four years and the claims were considered by three different patent examiners. And finally, the commercial success of the Hatch seal makes the presumption even stronger. In sum, in this circuit the statutory presumption is strong, and in this case it is very, very, very strong.

Judge McLaren, on the other hand, stated that notwithstanding the statutory presumption of validity, he had a duty to give the patent close scrutiny and concluded that a clear and convincing showing of obviousness was sufficient to warrant a holding of invalidity.[12] We find no error in the court's treatment of the presumption.

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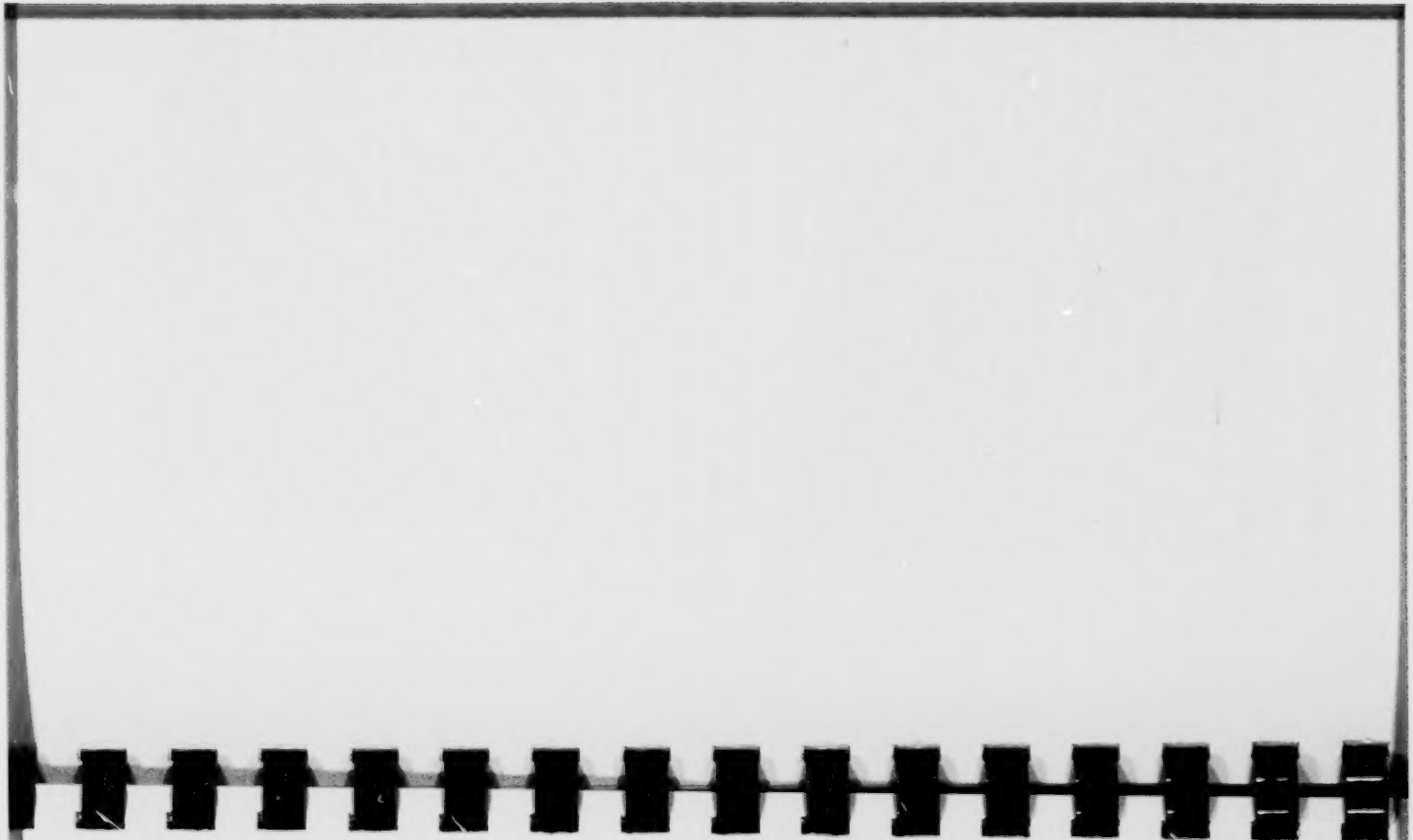
[11] Plaintiff-appellant's brief at 27, citing *Laser Alignment Inc.* v. *Woodruff & Sons, Inc.*, 491 F.2d 866, 871 (7th Cir. 1974). In that case, the court concurred in the district court's evaluation of the evidence and in its judgment on the vaidity issue. The opinion stated, in part:

> "As the district court correctly pointed out, a party asserting a patent's invalidity bears the burden of proving invalidity and must overcome by clear and convincing proof the presumption of validity established by 35 U.S.C. § 282."

[12] In his opinion Judge McLaren stated:

> "On the question of validity, plaintiff is of course entitled to a presumption that the Hatch patent is valid. 35 U.S.C. § 282. To overcome that presumption there must be clear and convincing evidence of invalidity. *Reese* v. *Elkhart Welding & Boiler Works, Inc.*, 447 F.2d 517, 527 (7th Cir. 1971). However, in light of the fact that a patent involves the granting of a monopoly and operates to take knowledge from the pubic domain, presumptions must not stand in the way of close scrutiny. As stated in *Graham* v. *John Deere Co.*, 383 U.S. 1, 6 (1966):
>
> "'[i]nnovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must 'promote the Progress of . . . useful Arts.' This is the standard expressed in the Constitution and it may not be ignored.'"
>
> App. 51-52.

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We agree, of course, that the presumption is not an idle gesture, either in this circuit or elsewhere. But we are not persuaded that Judge McLaren failed to give the presumption all the weight it deserved.

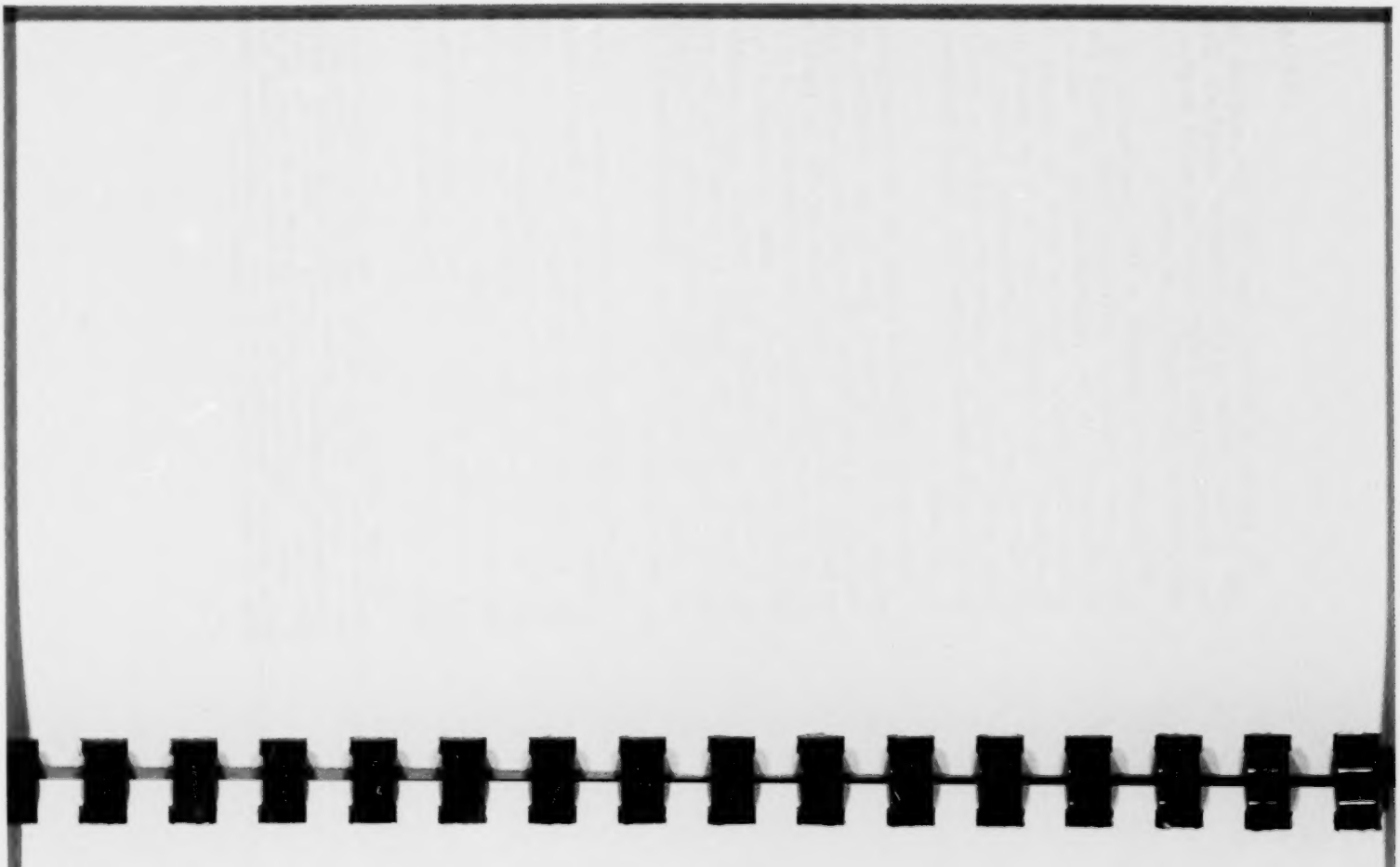
There are two aspects to the presumption of validity. First, as a matter of procedure, § 282 places the burden of persuasion on the party attacking the validity of the patent. This burden remains upon the alleged infringer throughout the proceeding and is in no sense dependent on the character of the proceedings before the Patent Office or the amount of prior art cited to, or considered by, the Patent Examiner. In its first aspect, the presumption is constant.

There is an additional aspect to the presumption which relates to the deference due to the technical expertise possessed by the Patent Office and not generally possessed by federal judges. Notwithstanding the ex parte character of the normal Patent Office prosecution,[13] if it appears that the prior art which is cited to establish invalidity in a judicial proceeding had already been considered by the Patent Office, the burden of overcoming the presumption of validity then rests heavily on the person attacking the patent. He must make a "clear and cogent" showing in order to prevail.

The presumption, however, never becomes so strong that a patent is completely unassailable. A demonstration that the art considered by the Patent Office is the same as the art considered by the court strengthens the presumption in the sense that it provides the justification for the requirement that invalidity be established by clear and convincing evidence, but such a demonstration is not also a bootstrap that lifts the presumption to a still higher level.

[13] Plaintiff cites us to *Williams Mfg. Co. v. United States Shoe Machinery Corp.*, 121 F.2d 273, 277 (6th Cir. 1941). There, after drawing the analogy to the growing recognition of finality accorded to administrative determinations supported by evidence, the court noted that it was "true, of course, that in the most strict sense, the granting of a patent is not, except when an interference is declared, the result of an adversary proceeding, as is usual in administrative determinations of agencies exercising quasi-judicial functions."

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The basis for the requirement that invalidity be established by clear and convincing evidence is largely, if not wholly, dissipated when pertinent prior art is shown not to have been considered by the Patent Office.[14] For then the Examiner's expertise may have been applied to an incomplete set of data and there can be no certainty that he would have arrived at the same conclusion in the face of the evidence and argument presented to the court. Nor may we safely assume that the Examiner has considered art which is not cited. On the contrary, we have held that the failure to cite pertinent prior art implies that it was overlooked by the Examiner.[15]

In this case Judge McLaren concluded that defendant had made a clear and convincing showing of invalidity. The presumption never imposes a heavier burden than that. It is surprising to find the plaintiff arguing in this case that an even stronger showing was required in view of the fact that the art considered most relevant by one of the inventors, and also considered highly relevant by the district court—namely, Payne '226—was *not* cited to the Patent Office.

Nor do we attach any significance to the fact that three different examiners rejected prior drafts of plaintiff's claims, or to the not unusual, though distressing, period of time which the Patent Office required to complete its task. A patent application which is so obviously meritorious as to result in an immediate allowance might well command more respect than one that ultimately survived a series of rejections followed by a series of narrowing redrafts of pertinent claims.

We agree with plaintiff that the evidence of commercial success is significant, but not because it enhances

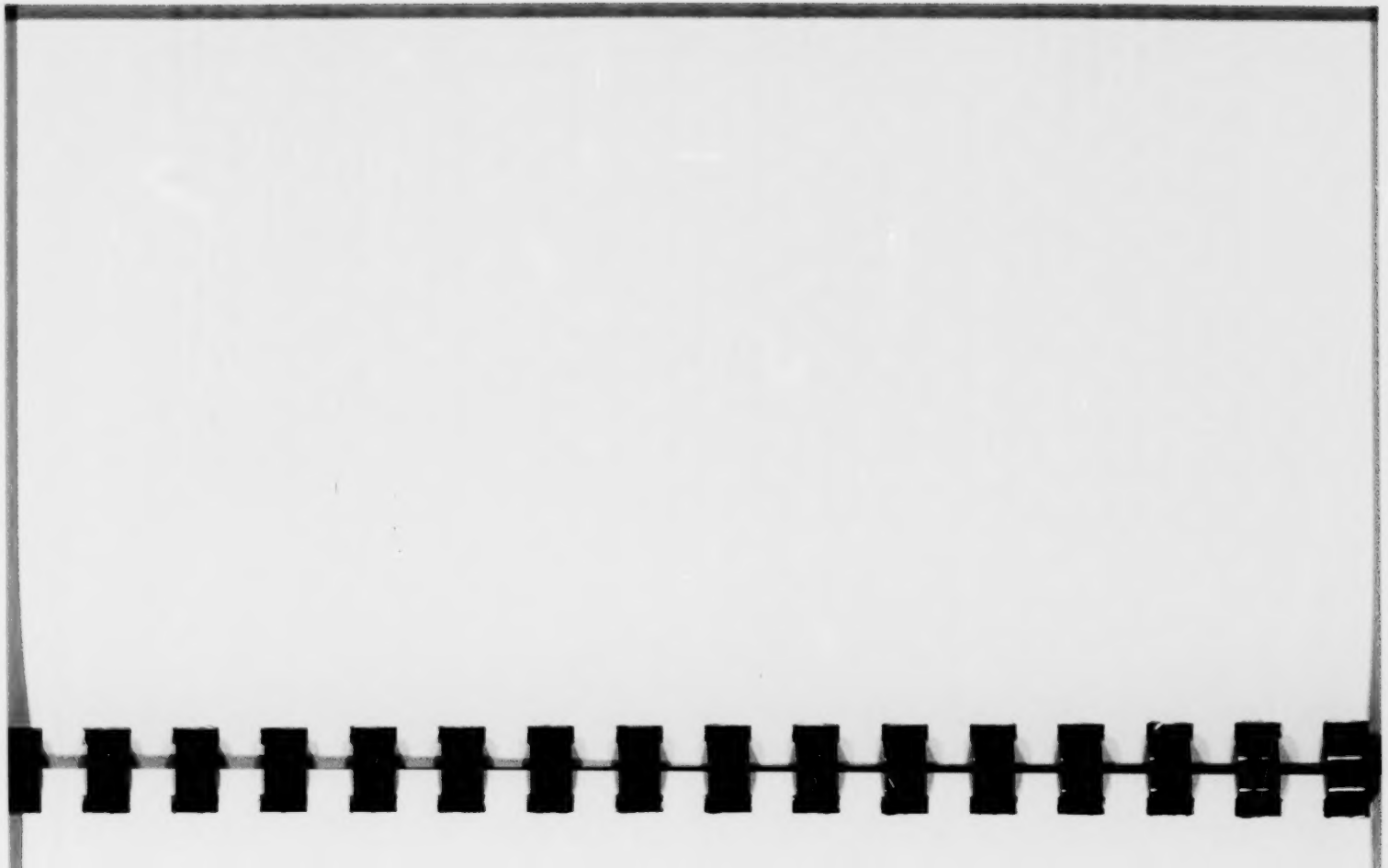
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[14] In *Deep Welding, Inc.* v. *Sciaky Bros., Inc.*, 417 F.2d 1227, 1234 (7th Cir. 1969), we said:

> "We adhere to the salutary rule that, except in most unusual circumstances, determinations made by an agency relying on its expertise in a field in which it is uniquely qualified should not be disturbed. In the patent area this rule requires that a patent be presumed valid over any prior art shown to have been considered by a patent examiner in the file of the patent.
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> • • •
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> [However,] the presumption of validity is largely, if not wholly, dissipated when pertinent prior art is shown not to have been considered during the processing of the patent application."

[15] *Milton Manufacturing Co.* v. *Potter-Weil Corporation*, 327 F.2d 437 (7th Cir. 1964).

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the importance of the presumption of validity. Rather, commercial success is persuasive circumstantial evidence bearing directly on the issue of non-obviousness. Commercial success demonstrates that there was a market for the patented device and implies that persons skilled in the art had an economic incentive to make it as soon as they could; the failure to produce a device satisfying a known demand indicates that the inventor's solution was not obvious.[16]

The validity of the conclusion depends upon the actual availability of the pertinent prior art to the persons seeking a solution to the problem.[17] If the critical reference came into existence, or was discovered, only a short time before the patented conception, commercial success may merely demonstrate nonobviousness as compared to the earlier, well known art, rather than when compared to the recent reference. In this case, commercial success of the Hatch seal strongly indicates that it was a nonobvious improvement over the complex devices described in the patent specifications and generally available on the open market in 1961. The question, however, is whether that success is equally persuasive on the question whether Hatch was a nonobvious improvement over Caterpillar's Duo Cone seal. Since applications for the patent covering Duo Cone were not made until 1959, and since there appears to have been no effort to market Duo Cone generally, the commercial success of the Hatch seal does not necessarily demonstrate its nonobviousness in light of Duo Cone.

The fact that the Duo Cone seal was not sold generally does not undermine the significance of its contribution to the art. An especially attractive feature of the Hatch seal was its ease of installation, a factor of less importance to Caterpillar than to other users because Caterpillar had such an excellent service organization. The development of a seal which would generally be salable

[16] For a history of the "commercial success" doctrine in patent law see Boyer, Commercial Success as Evidence of Patentability, 37 Fordham L.Rev. 573 (1969).

[17] Evidence that the prior art did not suggest the solution to skilled workers who labored without success for four years persuasively supported the holding of nonobviousness in *National Dairy Products Corp.* v. *Borden Co.*, 394 F.2d 887, 890 (7th Cir. 1968).

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was also of less importance to Caterpillar because its own equipment provided an adequate demand for Duo Cone to justify the capital expenditures necessary to produce it. Accordingly, the fact Hatch was more useful and more salable than Duo-Cone does not necessarily imply that it was not obvious in the light of Duo Cone.[18]

One feature of the Hatch device which no doubt contributed to its commercial success was the "strip-like closure means" which holds the two halves of the double face seal together, keeping the precisely machined faces free from grit prior to installation.[19] This feature contributed to the ease of installation of the Hatch seal. However, this band was described in the patent as well known; if one assumes that a seal which could otherwise be installed as a unit was not patentable, the addition of the closure strip would appear obvious.

We also agree with plaintiff that the issue of obviousness raises a question of law and, therefore, we are free to disagree with the district court even if we cannot brand his conclusion as clearly erroneous. Nevertheless, as we read the transcript of the testimony in this case, we are

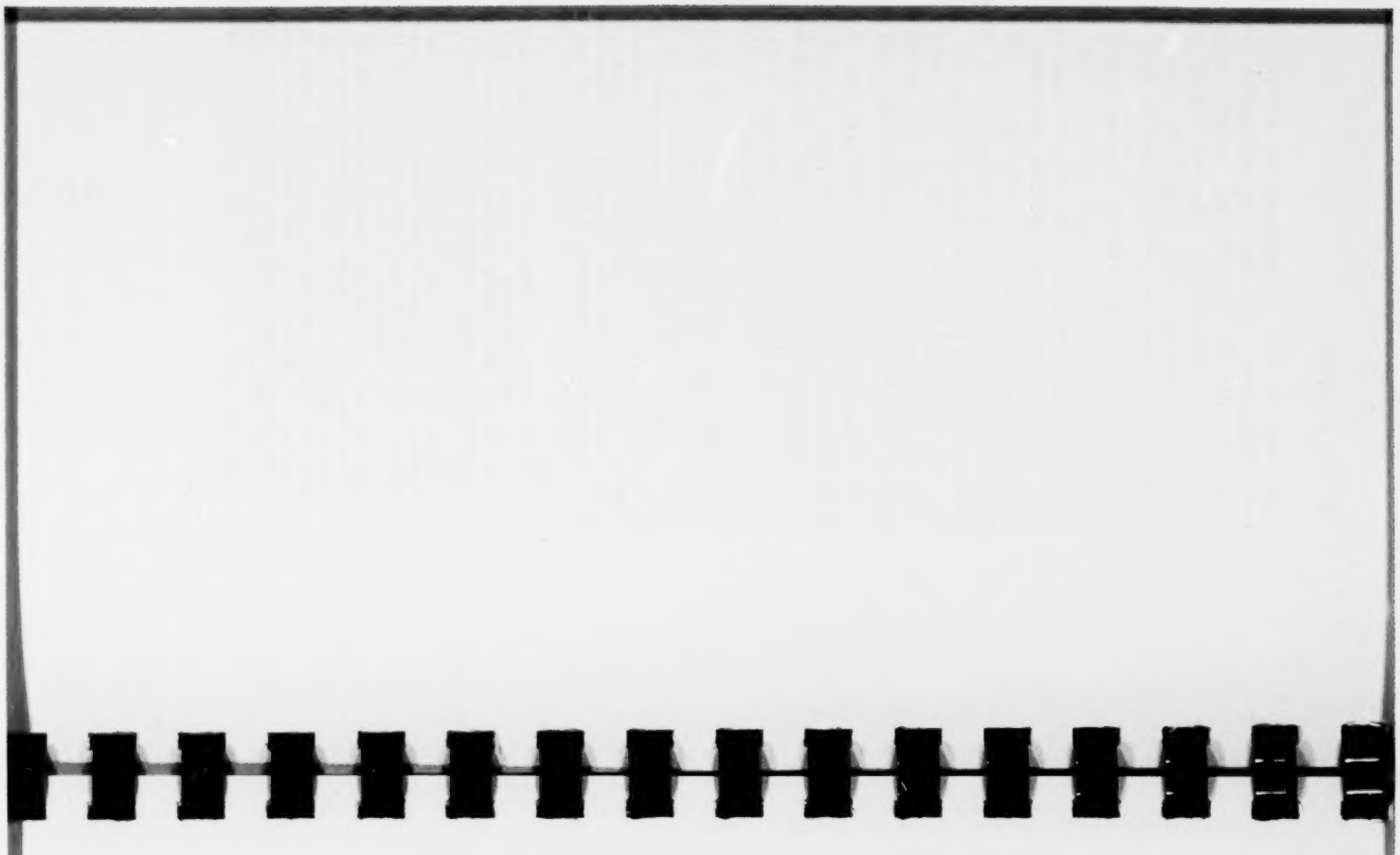
[18] Plaintiff admits that Duo Cone was a great improvement over the prior art at the time of its invention. One of plaintiff's witnesses testified that Caterpillar had already incurred the capital expense of tooling costs for a DuoCone counterbore (Morely, Tr. 360), and that Caterpillar had "one of the best service organizations in the world" (Morely, Tr. 187). Since some of the advantages of the Hatch seal would therefore appear less important to Caterpillar than to some other companies, the inventors of Duo Cone had less incentive to make further improvements after the invention of Duo Cone than did the plaintiff.

[19] Plaintiff admits that Duo Cone was a great improvement over the

3. The seal assembly of claim 2 wherein said sealing rings are held in end face sealing surface engagement by pressure and heat disintegratable means applied to adjacent surfaces of said sealing rings on said sealing rings to hold said sealing rings in assembled engagement with said secondary sealing members frictionally mounted in the seats of said sealing rings prior to and initially during installation of said seal assembly in a shaft assembly.

4. The seal assembly of claim 2 wherein said sealing rings are held in end face sealing surface engagement by strip-like closure means overlying the outer periphery of said sealing rings in overlapping engagement therewith to hold said sealing rings in assembled engagement with said secondary sealing members frictionally mounted in the seats of said sealing rings prior to and initially during installation of said seal assembly in a shaft assembly, said strip-like closure means being formed from material which disintegrates upon operational use of said seal assembly.

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impressed with the importance of having live witnesses, subject to cross-examination, explain the operation of physical exhibits in a way which enables a district judge to understand what is before him and to interrupt with proper questions when he does not understand. Our study of the testimony, the documents, and the physical exhibits has, we believe, led us to a fair understanding, at least of the Hatch device, the accused device, the Duo Cone seal, and the use of the Belleville washer in the prior art. But our understanding of the written record, even when aided by briefs and oral argument, is comparable to that of a student who has taken a correspondence course instead of attending classes on a daily basis with a laboratory available for experiment when needed. The trial judge really is in a better position to evaluate the obviousness issue than we are. Therefore, although we frankly acknowledge respect for plaintiff's advance in the art, plaintiff has not persuaded us that the district judge made an error of law. In this court it is appellant's burden to persuade us that an intelligent district judge, who has demonstrated a thorough understanding of the relevant art, committed an error requiring reversal. This plaintiff has not done. We accept the district judge's conclusion that, after the significant breakthrough achieved by the Duo Cone seal, it was obvious for a person skilled in the art to experiment with a configuration employing a Belleville washer and a metal ring with a right-angled seat opposed to another right angle to compress the rubber ring upon installation of the seal and, therefore, that the Hatch device does not disclose the degree of inventiveness required by § 103.[20]

II.

For similar reasons, and with comparable misgivings, we accept Judge McLaren's appraisal of the defendant's argument that it should be awarded fees because plaintiff

[20] We find no merit in plaintiff's arguments (1) that the district court's finding that Hatch had not been anticipated required the further conclusion that Hatch was not obvious; (2) that the difference between the operation of the rubber torus which rolls up under pressure, in the Duo Cone seal, and the Belleville washer which remains seated and tends to flatten to a vertical position, in the Hatch device, requires a finding of non-obviousness; or (3) that the district court erroneously characterized the level of skill in the art as quite high after the development of the Caterpillar Duo Cone seal.

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was guilty of fraud, or at least inequitable conduct, in the Patent Office prosecution.

Certainly Payne '226 should have been cited. We are not persuaded that it was an irrelevant reference because it described a Belleville washer made of Teflon rather than rubber.[21] Nor do we find any merit in the suggestion that the examiner was presumptively aware of Payne '226 since other Payne patents were cited.[22] Nor do we condone what we assume was a lack of diligence in failing to cite prior art which one of the inventors recognized as highly pertinent before the application was filed. Nevertheless, the district judge could properly conclude that there was insufficient evidence of scienter to support a finding of fraud.

We also share Judge McLaren's appraisal of the exhibit to the Morley affidavit. Surely, if the Patent Office proceedings had been of an adversary character, the discrepancy between an actual groove width of .118 inches,[23] and a schematic representation, not drawn to scale, that appears to portray a groove about five times as wide, would have been made apparent to the examiner. On the other hand, if the examiner studied the affidavit and the exhibit with sufficient care really to appreciate its relevance to the Krug reference, he must also have recognized the discrepancy between the actual and the apparent width of the groove and, further, understood its relationship to flexibility of the washer. We think this exhibit illustrates the hazards inherent in *ex parte* tech-

[21] As the district court found, the language referring to "a material which is relatively incompressible" (column 3, lines 43-44), or "a material such as 'Teflon' which is not readily deformable under compressional forces. . ." (column 2, lines 17-19), includes rubber (Finding No. 23); and, in any event, rubber was commonly used for the secondary sealing ring in the late 1950s.

[22] In *Armour and Co.* v. *Swift & Company*, 466 F.2d 767, 779 (1972) we said:

> ". . . we think that it is unfair to a busy Examiner, no matter how diligent and well informed he may be, to assume that he retains details of every pending file in his mind when he is reviewing a particular application. Especially since Patent Office proceedings are ex parte, the applicant has the burden of presenting the Examiner with a complete and accurate record to support the allowance of letters patent."

[23] That is the size described on the exhibit, but we are frankly not sure why the width was not .122" since that is the difference between 2.194 and 2.072.

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nical presentations, but we accept Judge McLaren's appraisal of its significance in the context of the entire case.

Based on our review of the record and the briefs, we conclude that the case was well presented in the district court by both sides, that the trial judge correctly found the facts and accurately applied the law, and that his ultimate conclusions should not be disturbed. In all respects the judgment is

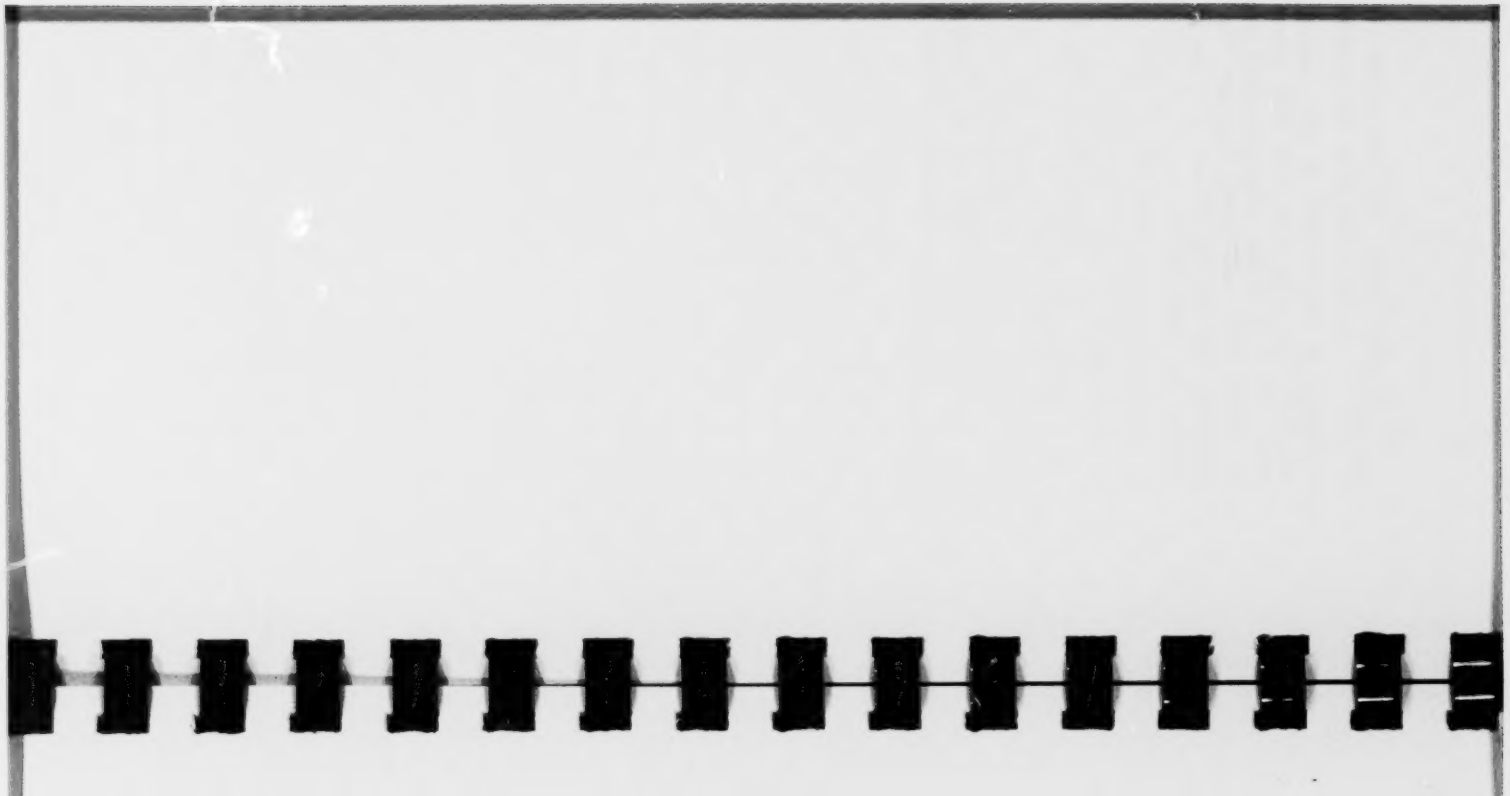
AFFIRMED.

A true Copy:

Teste:

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Clerk of the United States Court of Appeals for the Seventh Circuit



United States Court of Appeals

For the Seventh Circuit

Chicago, Illinois 60604

November 4, 1975.

Before

Hon. LUTHER M. SWYGERT, Circuit Judge

Hon. JOHN PAUL STEVENS, Circuit Judge

Hon. WILLIAM E. DOYLE, Circuit Judge

CHICAGO RAWHIDE MANUFACTURING COMPANY,
Plaintiff-Appellant,
Cross-Appellee,

No. 74-1714, 1715 vs.

CRANE PACKING COMPANY,
Defendant-Appellee
Cross-Appellant.

Appeal from the United States District Court for the Northern District of Illinois, Eastern Divsn.

(72 C 658)

On consideration of the petition for rehearing filed in the above-entitled cause,

IT IS HEREBY ORDERED that the petition for rehearing in the above-entitled appeal be, and the same is hereby, DENIED.

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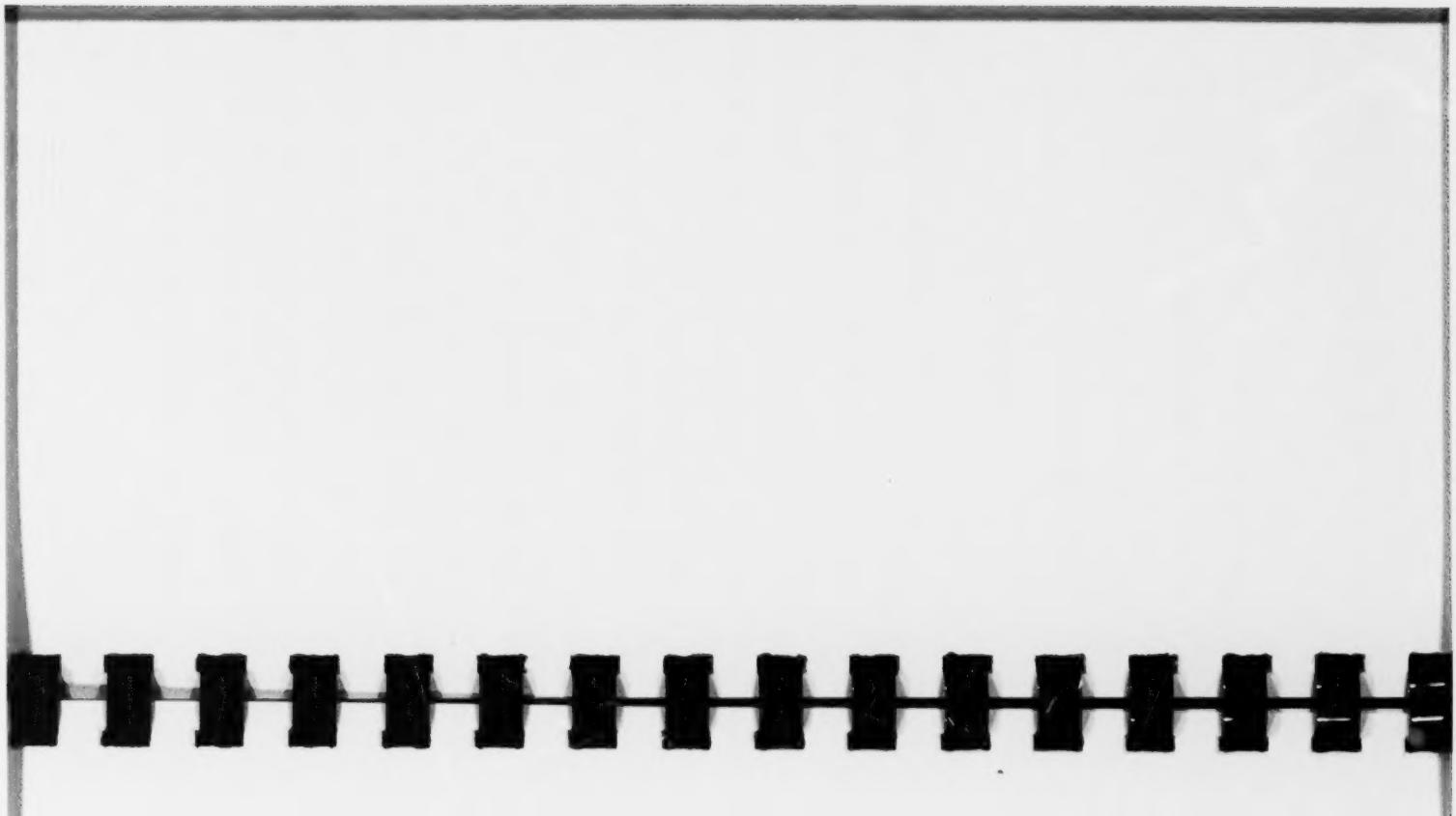
IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

ICAGO RAWHIDE MFG. CO.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	No. 72 C 658
	)	
ANE PACKING CO.,	)	
	)	
Defendant.	)	

MEMORANDUM OPINION AND ORDER

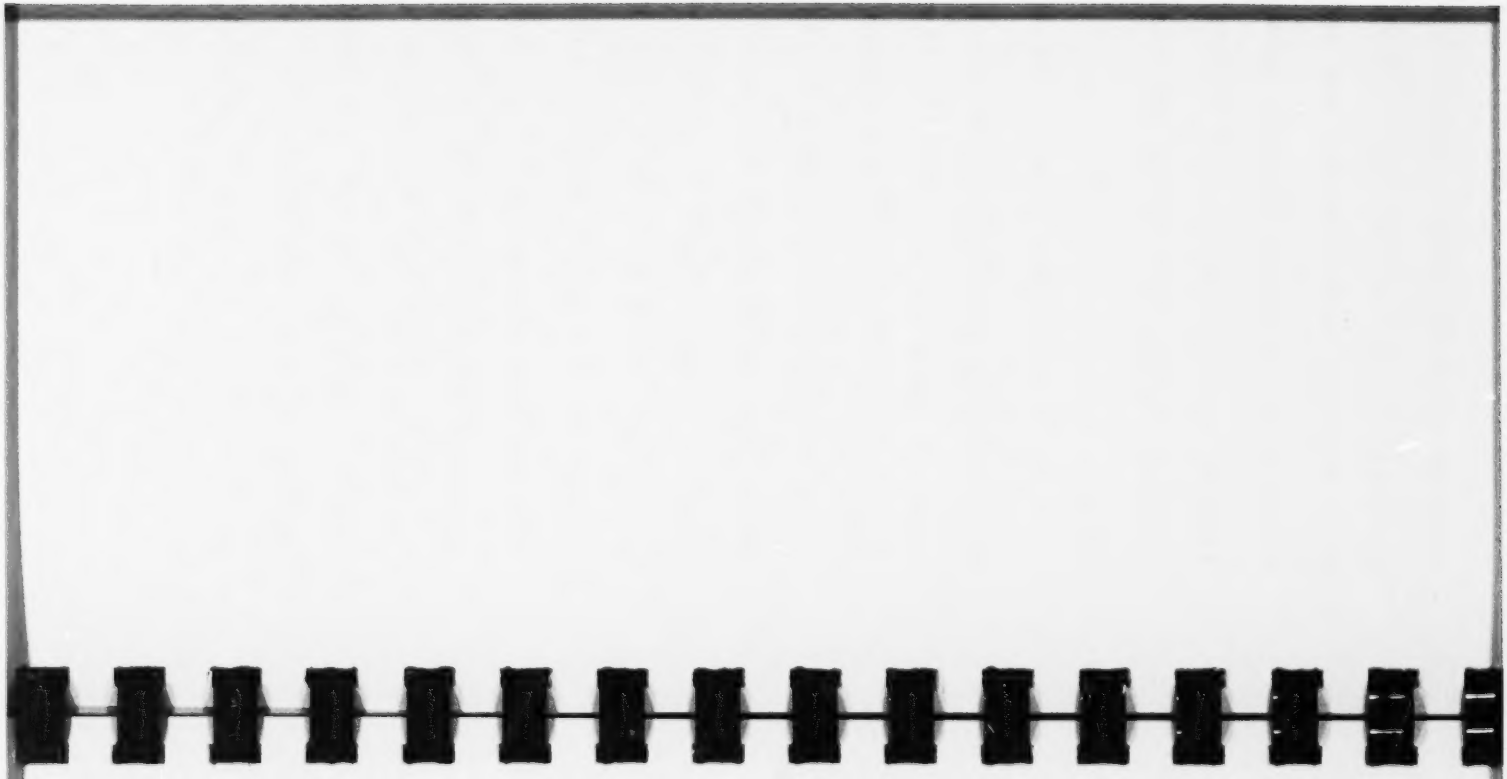
This matter was tried before the Court without jury. Based on the evidence and the law, the Court nds that the Hatch, et al Patent No. 3,241,843 is valid, but were it valid, it would be infringed by e defendant's accused device.

The complaint alleges that plaintiff is the ner of the entire right, title and interest in, to and der United States Letters Patent 3,241,843 ("Hatch tent") that was issued on March 22, 1966. It is further leged that defendant has infringed said patent by nufacturing, offering to sell and selling, in this strict and elsewhere, end face rotary seal assemblies de in accordance with and embodying the invention



covered by said patent, without right or license from plaintiff. Plaintiff seeks to have defendant enjoined from further manufacture, use and sale of the allegedly infringing devices; demands damages arising from the alleged infringement; and requests that defendant be ordered to pay its costs and reasonable attorneys' fees.

Defendant admits the issuance of the patent which is the subject matter of this suit, but denies that it was duly and legally issued. It further denies that it has infringed the patent, should it be found valid. Numerous affirmative defenses are alleged which go to the validity of the Hatch patent: It is asserted that (1) the alleged invention was anticipated by the prior art, 35 U.S.C. §102; (2) the subject matter of the claims of the Hatch patent, in light of the prior art, was obvious to a person having ordinary skill in the seal art at the time the alleged invention was made, 35 U.S.C. §103, (3) the claims of the patent fail to particularly point out and distinctly claim the subject matter of the purported invention as required by 35 U.S.C. §112; and (4) plaintiff was guilty of fraud on the Patent



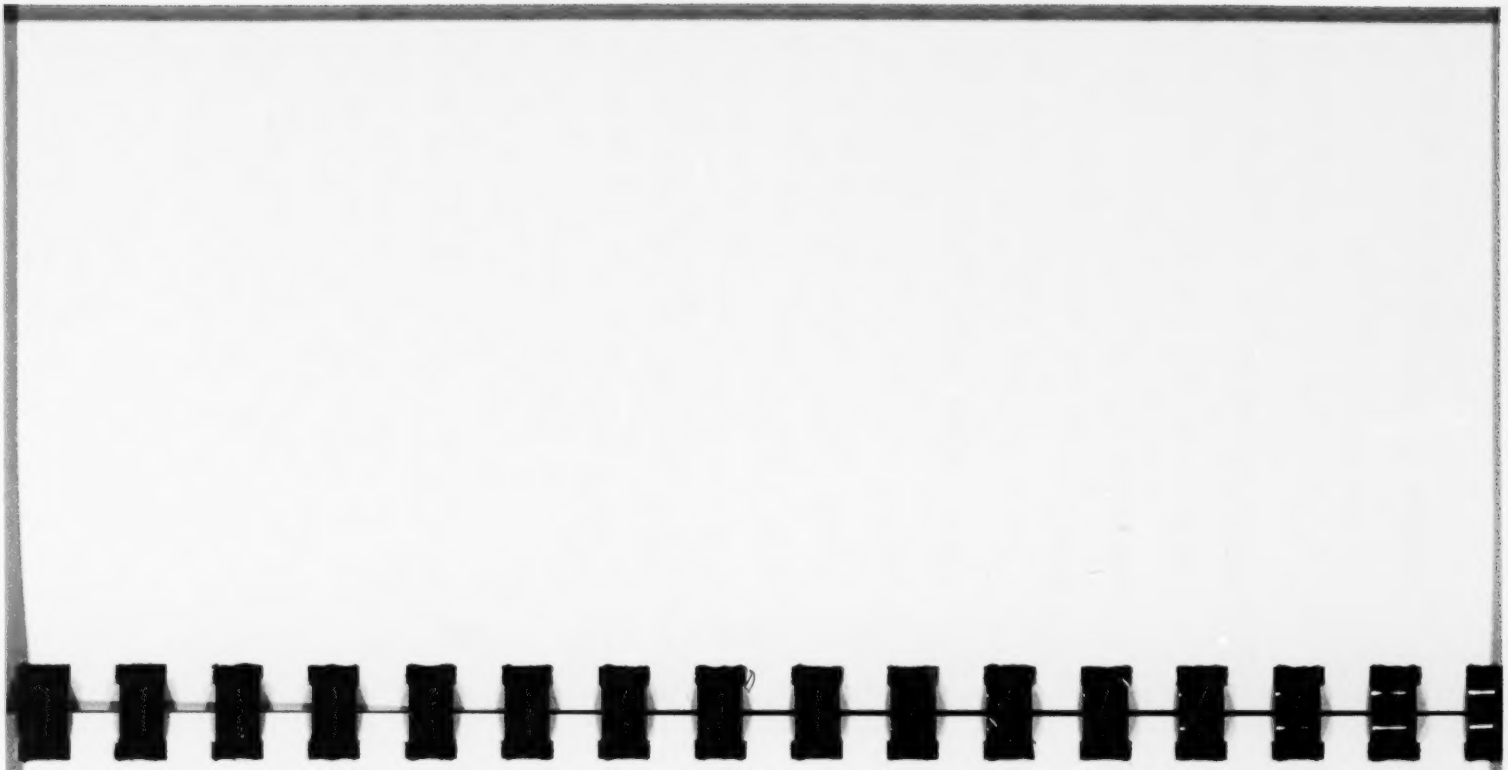
Office or inequitable conduct in the prosecution of the Hatch patent.[1/]

As to the issue of infringement, it is alleged that plaintiff is estopped from asserting that the claims of its patent have sufficient scope to cover or embrace any product or device made by defendant. This affirmative defense is based on the language of the claims, the prior art and the proceedings in the Patent Office and is commonly known as file wrapper estoppel.

In a separate order issued simultaneously with this opinion, leave was granted to amend the answer to allege that the subject matter of Figures 7, 9, 10 and 11 had been dedicated to the public. However, it was determined that there was no evidence that the claims read on Figure 11 and accordingly defendant was not permitted to amend the answer to allege that various other claims were dedicated to the public as well.[2/]

1/ Defendant contends that this alleged fraud entitles it to recovery of attorneys' fees pursuant to 35 U.S.C. §285.

2/ Defendant withdrew its contention that plaintiff is barred from bringing this suit by reason of the laches doctrine.



Defendant filed a counterclaim seeking a declaratory judgment that the Hatch patent is invalid and not infringed by it.

The following constitute this Court's findings of facts and conclusions of law.

A.

1. Plaintiff is an Illinois corporation with its principal place of business at Elgin, Illinois.

2. Defendant is an Illinois corporation with its principal place of business in Morton Grove, Illinois.

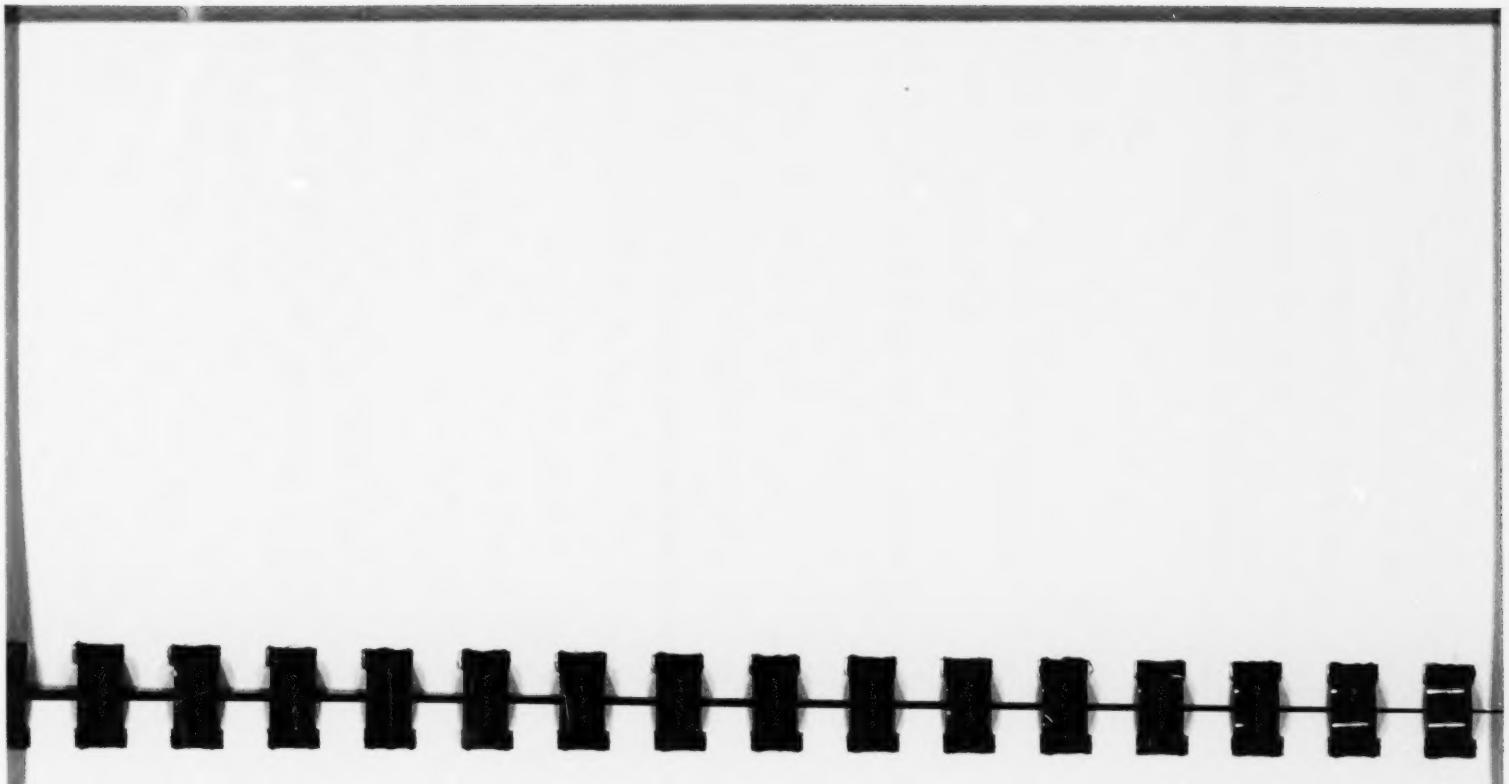
3. Plaintiff and defendant are both engaged in the business of manufacturing and selling mechanical seals and have been for many years.

4. Plaintiff is the owner of United States Patent No. 3,241,843, issued on March 22, 1966.

The Hatch Patent In Suit

5. The alleged invention of the Hatch patent was made in May 1961. The Hatch patent was applied for on November 29, 1961, and issued March 22, 1966.

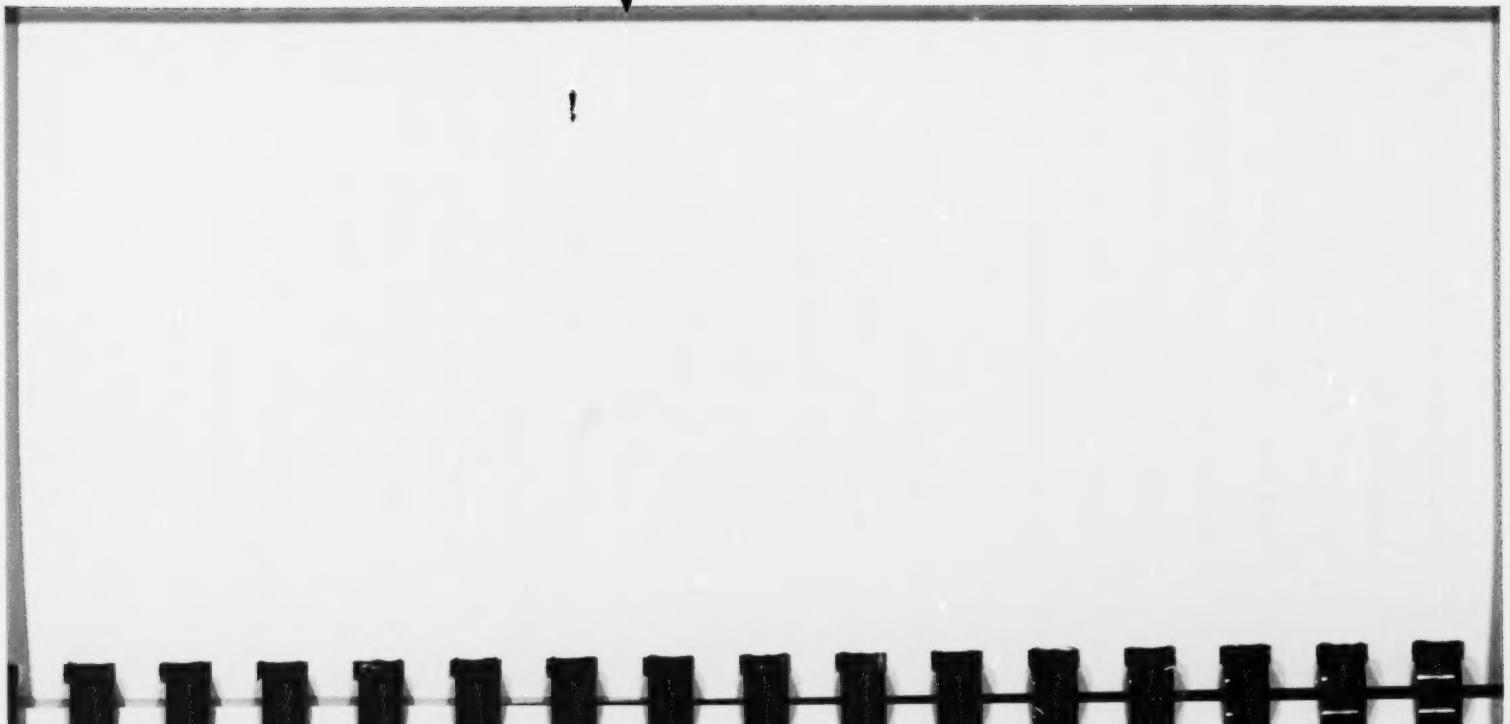
6. The patent in suit relates to a single end face rotary mechanical seal and a double face rotary



mechanical seal. Such seals provide a leak-proof barrier between relatively moving parts in machinery, e.g., a housing with an opening through which a rotating shaft extends. End face seals have a very broad range of applications. Heavy duty seals are commonly used in the track rollers of earth moving equipment and other forms of these seals are used in clothes washers, diswashers and automative water pumps.

7. The single face seal consists of two parts: a metal ring and a rubber ring (called "secondary sealing member"). The metal ring has a radial face which bears against an opposing radial face on a housing or other part to form the primary seal. The rubber ring is mounted in a seat on the metal ring. Its opposite end is seated in a wall of the housing or cavity in which the seal is placed. The rubber ring, upon installation, is compressed to press the metal ring against its opposing radial face. The rubber ring acts as a spring to keep the primary sealing faces firmly pressed together to prevent leakage.

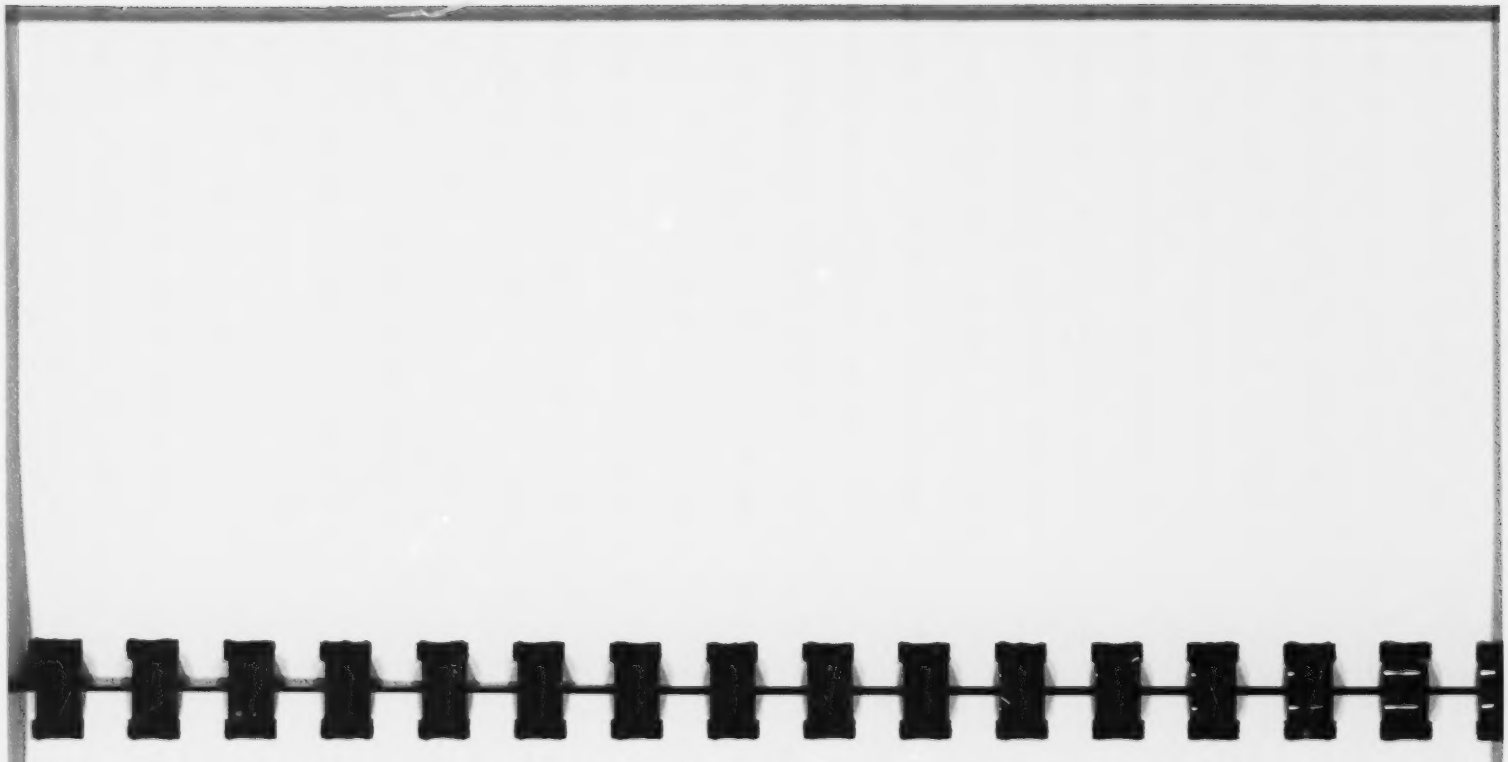
8. The double face seal consists of two identical seals mounted with their metal rings face to face. The second seal takes the place of the opposing radial



face against which the single seal bears. The rubber rings are mounted between the metal rings and the walls of the housing or cavity in which the seal is placed. These walls are moved by bolts or screws toward each other to place the rubber under pressure to constantly press the metal rings together. Thus, as the metal rings wear, they are nevertheless kept firmly pressed together by the spring action of the rubber rings. One metal ring is stationary and the other metal ring rotates. The stationary ring is sealed by its rubber ring to a stationary part, either the cavity wall of the shaft extending through it. The rotating metal ring is sealed by its rubber ring to a rotating part, which may be either cavity wall or shaft. The faces of the metal rings form the primary seal. They are pressed together, axially of the shaft, by the spring action of the rubber rings. The rubber rings form a secondary seal between the metal rings and the cavity walls. The rubber rings also provide the torque or force to cause one metal ring to rotate and to hold the other metal ring stationary against rotation.

9. Claims 1, 5, 6 and 7 of the patent recite one metal ring and one rubber ring. Claims 2, 3, 4, 8, 9 and 10 recite a pair of metal rings and a pair of rubber rings.

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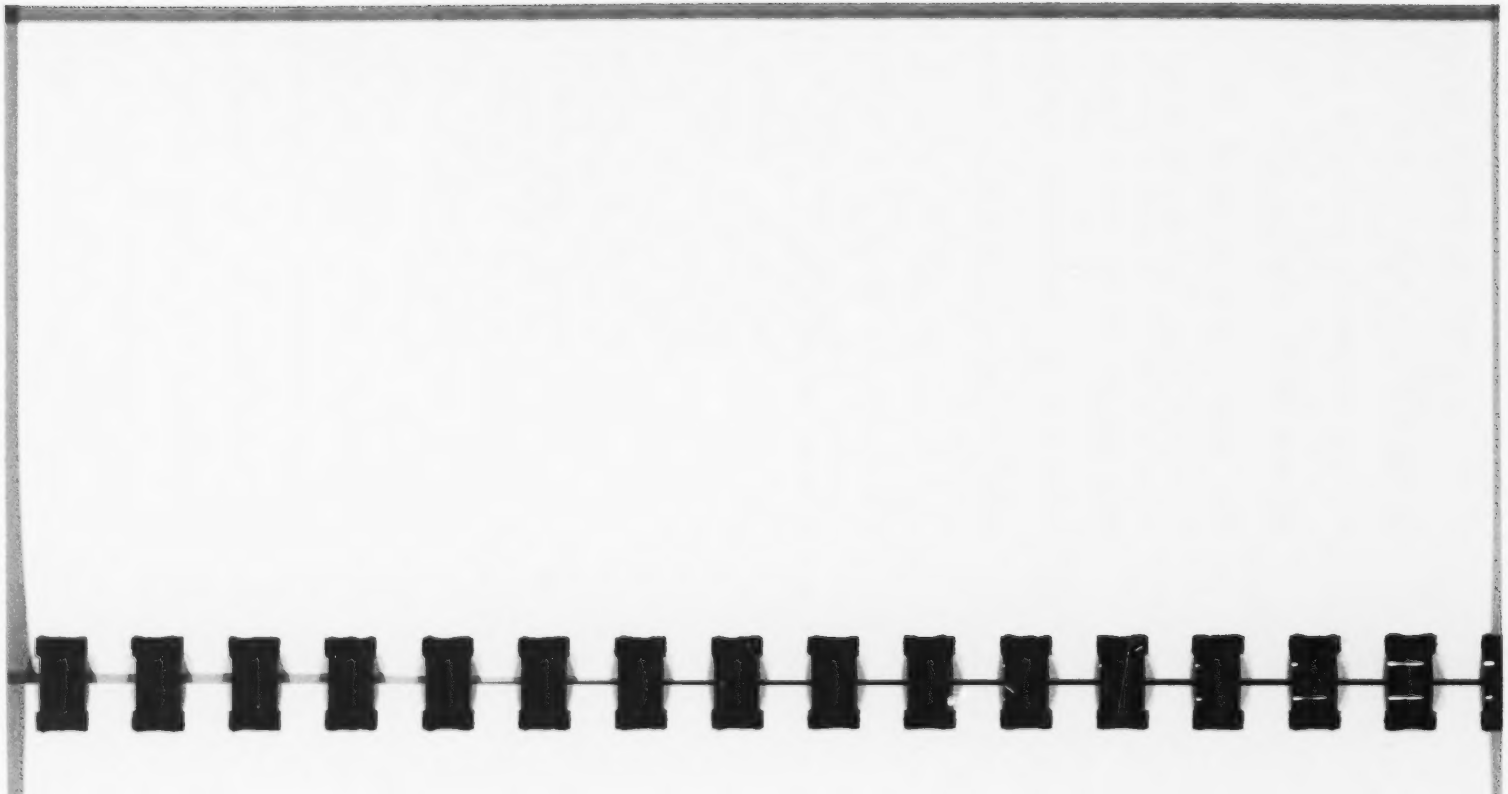
10. Although plaintiff argues that its invention resides in the entire claimed combination, it has taken the position that the important items in the Hatch claims are: (a) a right angle seat in the metal ring in which the rubber ring is placed, and (b) the shape of the rubber ring, which is stated in the claims to be "an effective frusto-conical shape" with a cross-sectional configuration "generally conforming to a parallelogram".

11. With respect to the shape of the rubber ring, the Hatch patent specification states as follows:

> "While the secondary sealing members illustrated and described herein are termed as 'frusto-conical,' it will be understood that the invention is of a scope sufficient to include the use of secondary sealing members of shapes other than true 'frusto-conical' shape. As long as a secondary sealing member is shaped to permit adequate axial and radial compression thereof in the manner and to the extent described to provide the requisite functions, such a secondary sealing member comes within the scope of this invention." (Col. 7, line 54-63)

The patent specification sets out the requisite functions of the secondary sealing members as the establishment (a) of axial sealing pressure against the metal ring; (b) torque to turn the rotating metal ring and to hold the stationary metal ring; and (c) efficient sealing between

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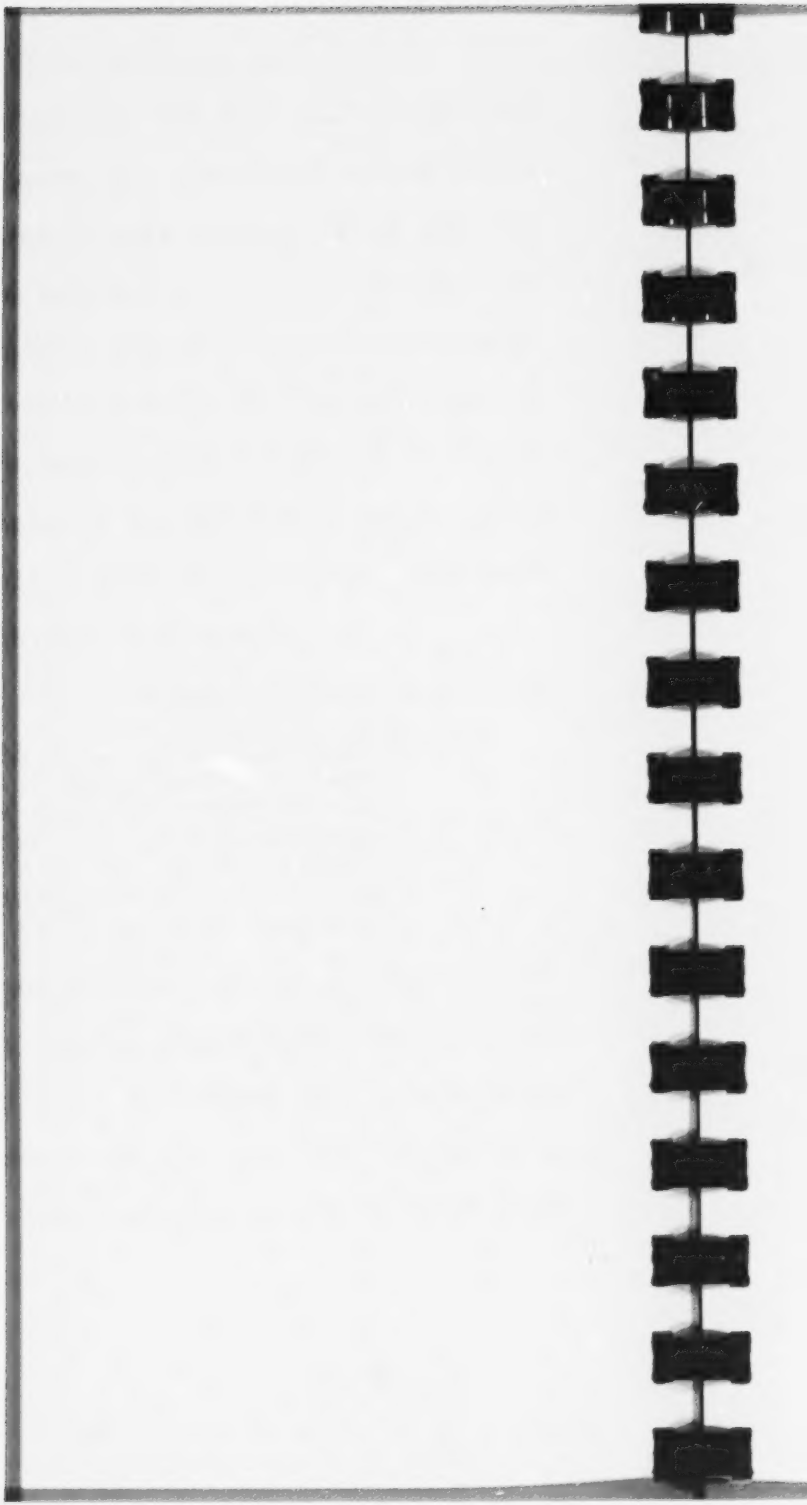
the metal ring and the cavity wall (Col 2, lines 4-5). These basic functions are common to other end face seals but the Hatch patent specification states it is capable of "improving certain aspects and characteristics of these functions." In their drawing, Hatch et al show a rubber ring not of true frusto-conical shape, but of the shape of the old "Belleville" rubber ring. The Belleville ring is the shape of the section of a partially hollow cone cut vertically by two cylinders of different sizes.

12. Claim 1 of the Hatch patent describes the secondary sealing ring as

> "formed solely from distortively resilient solid rubber material and in the form of a ring provided with an effective frusto-conical shape . . . the cross-sectional configuration of said secondary sealing member further generally conforming to a parallelogram. . . ." (Col. 8, lines 4-10)

Said language is essentially repeated in claims 2, 5 and 8. The composition of the rubber rings is not specified. The patentees thus leave it to the man skilled in the seal art to select a rubber composition that will function as described.

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March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 1

Fig. 1

Appendix B

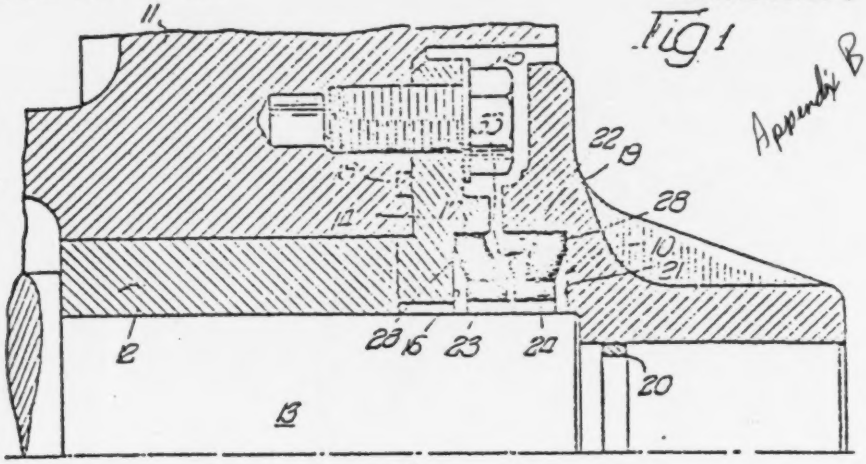


Fig. 2

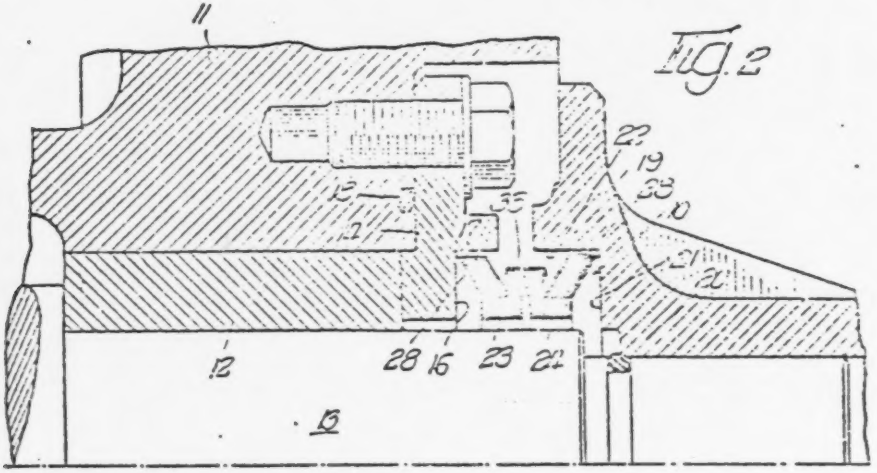
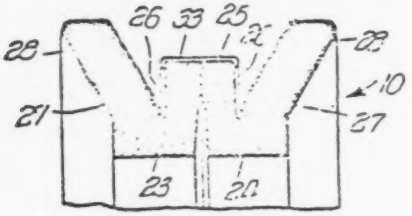


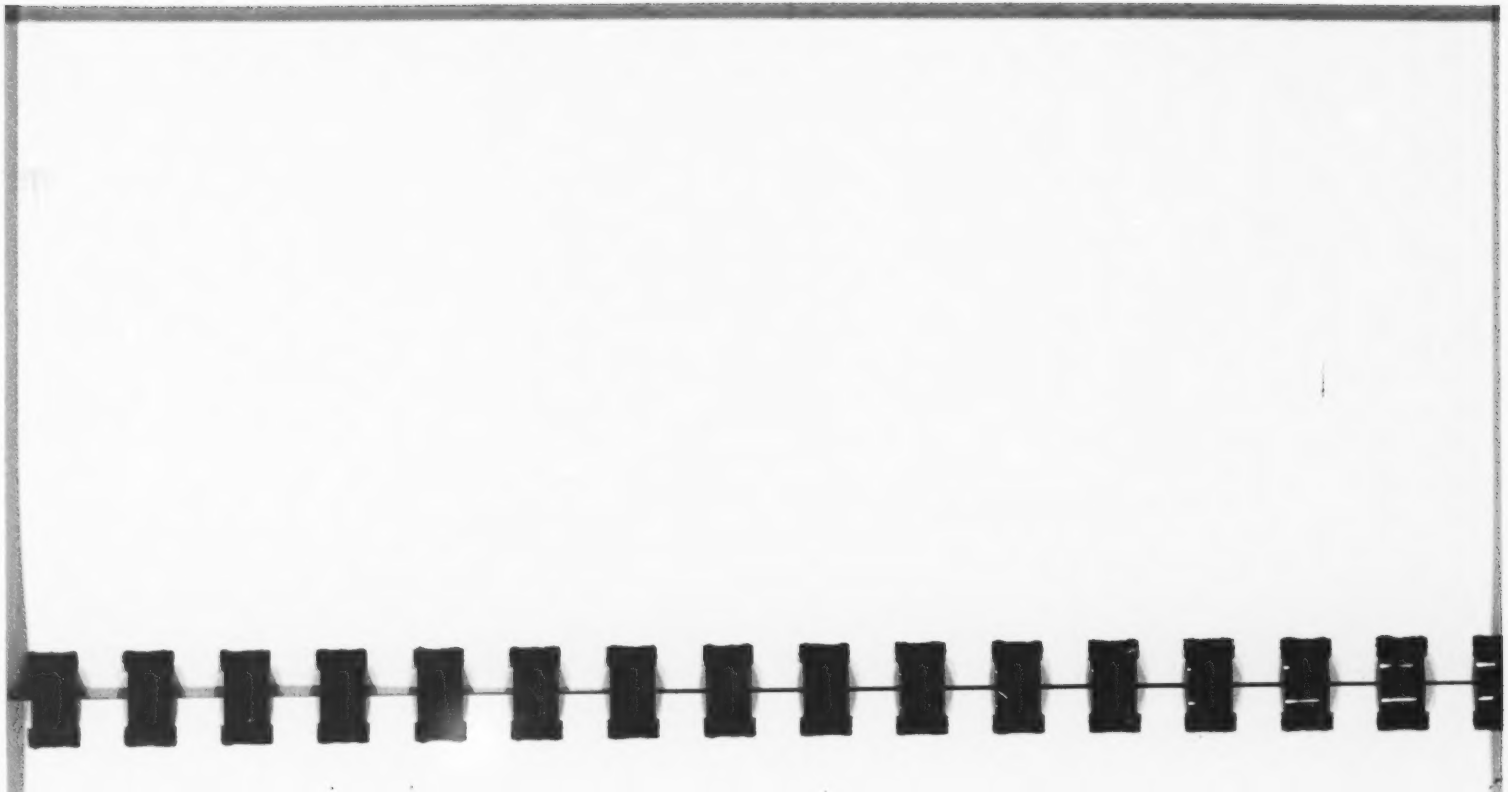
Fig. 3



Inventors:
Seymour C Hatch,
James P Morley.
Richard W Blair.
By Cromwell, Chait & Hudson

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March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 2

Fig. 4

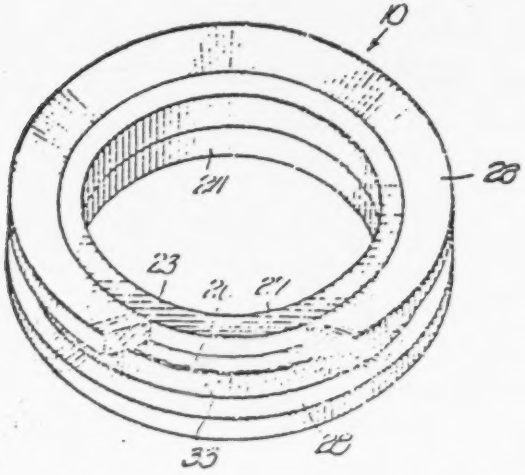
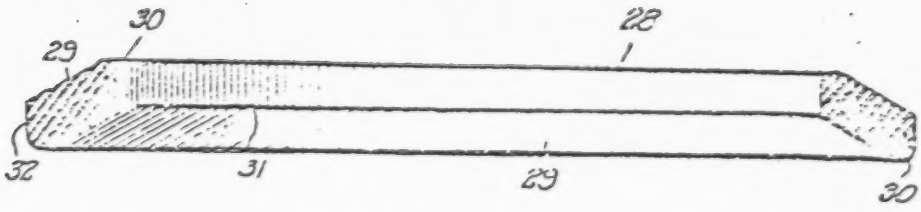
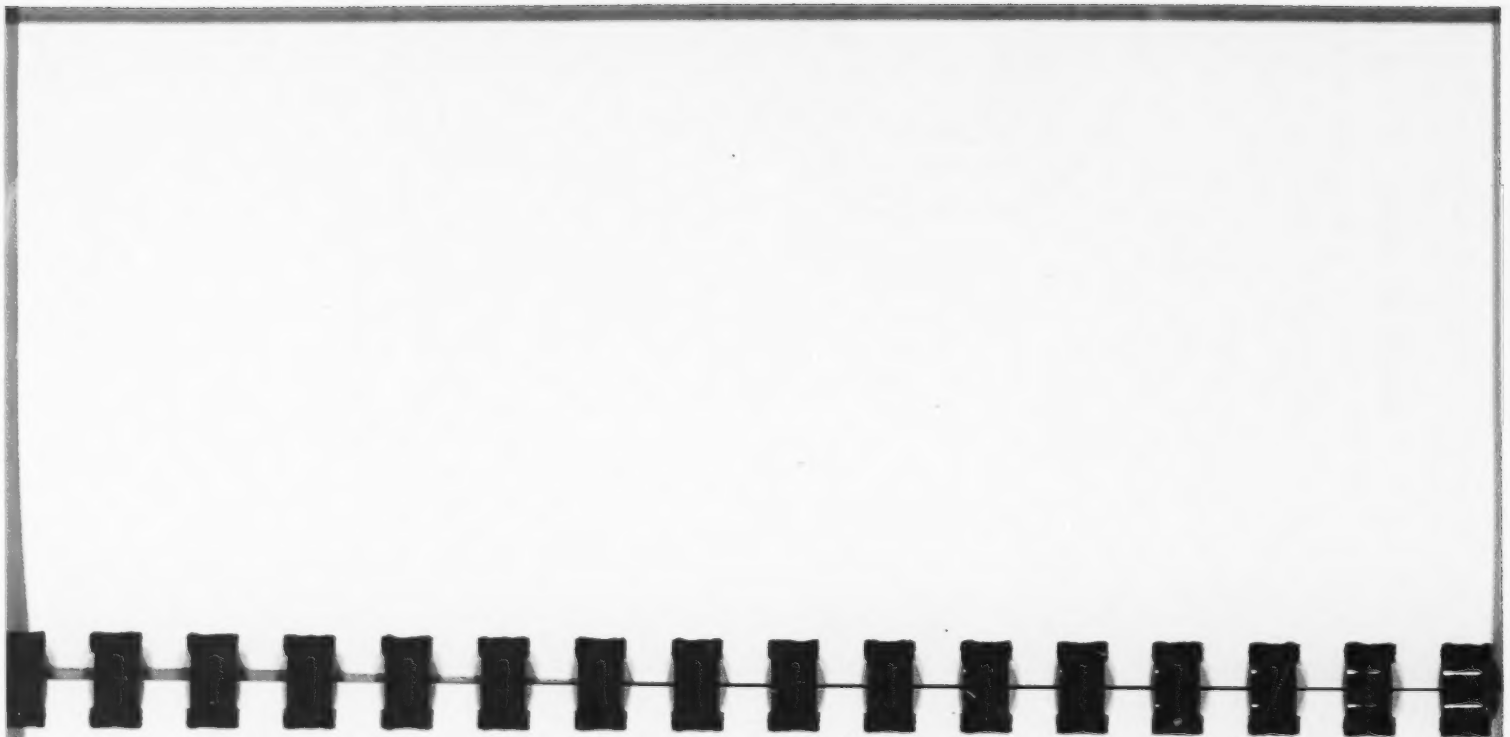


Fig. 5



Inventors:
Seymour A. Hatch,
James P. Morley,
Richard W. Blair,
By Connolly, Strunk & Warden
Attys.



March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 3

Fig. 6

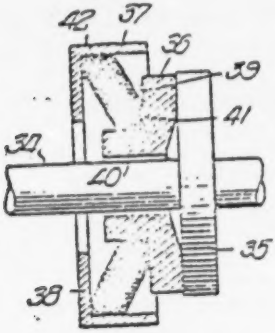


Fig. 7

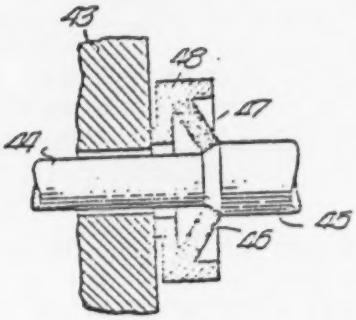


Fig. 8

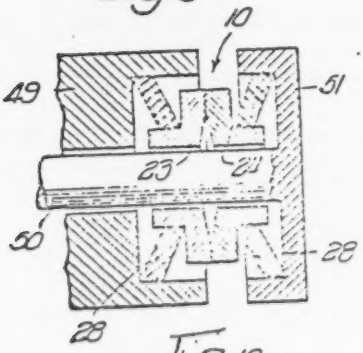


Fig. 9

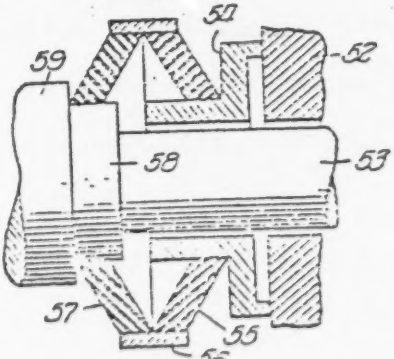


Fig. 10

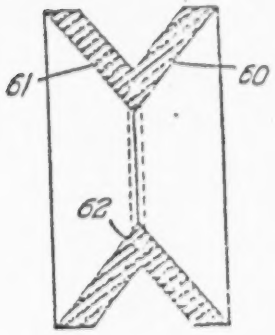
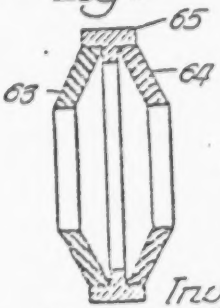


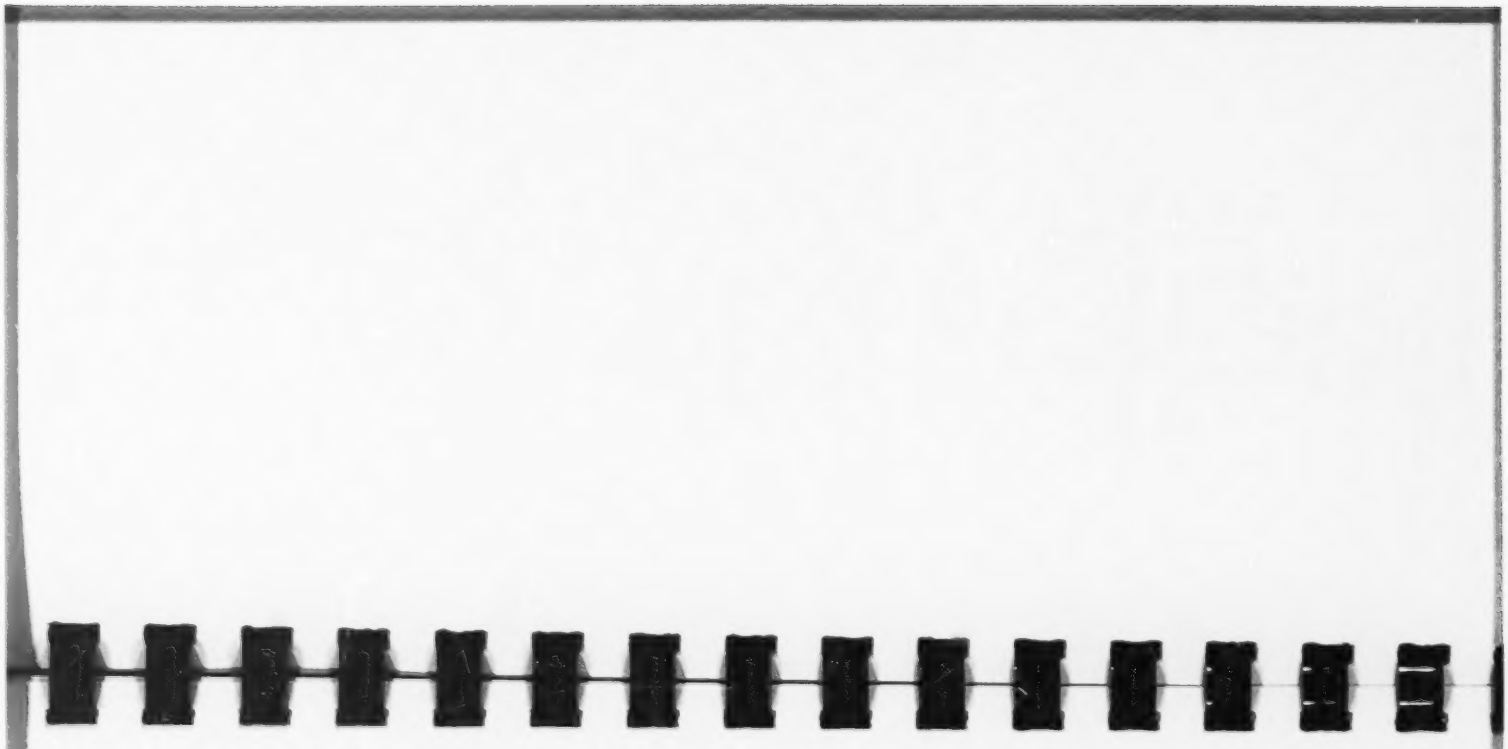
Fig. 11



Inventors:
Seymour A Hatch,
James P Morley.
Richard W Blair.
By Cromwell, Crouch & Mason

27

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13. Claim 1 of the Hatch patent describes the metal primary sealing ring as having a radial outer end face sealing surface, with

> "a periphery of said sealing ring axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions. . . ." (emphasis added)

Defendant points to the absence of limits on the slant of the surfaces to support its contention that the claims are indefinite. Plaintiff responds by arguing that the drawings and other materials indicate that these divergent surfaces form the seat and the specification states that the device has a right angle seat (see, e.g., Col. 4, lines 11-13).

14. The Hatch claims expressly provide that the rubber ring, upon operative mounting or installation, is "distortively compressed throughout the entire cross-section thereof."

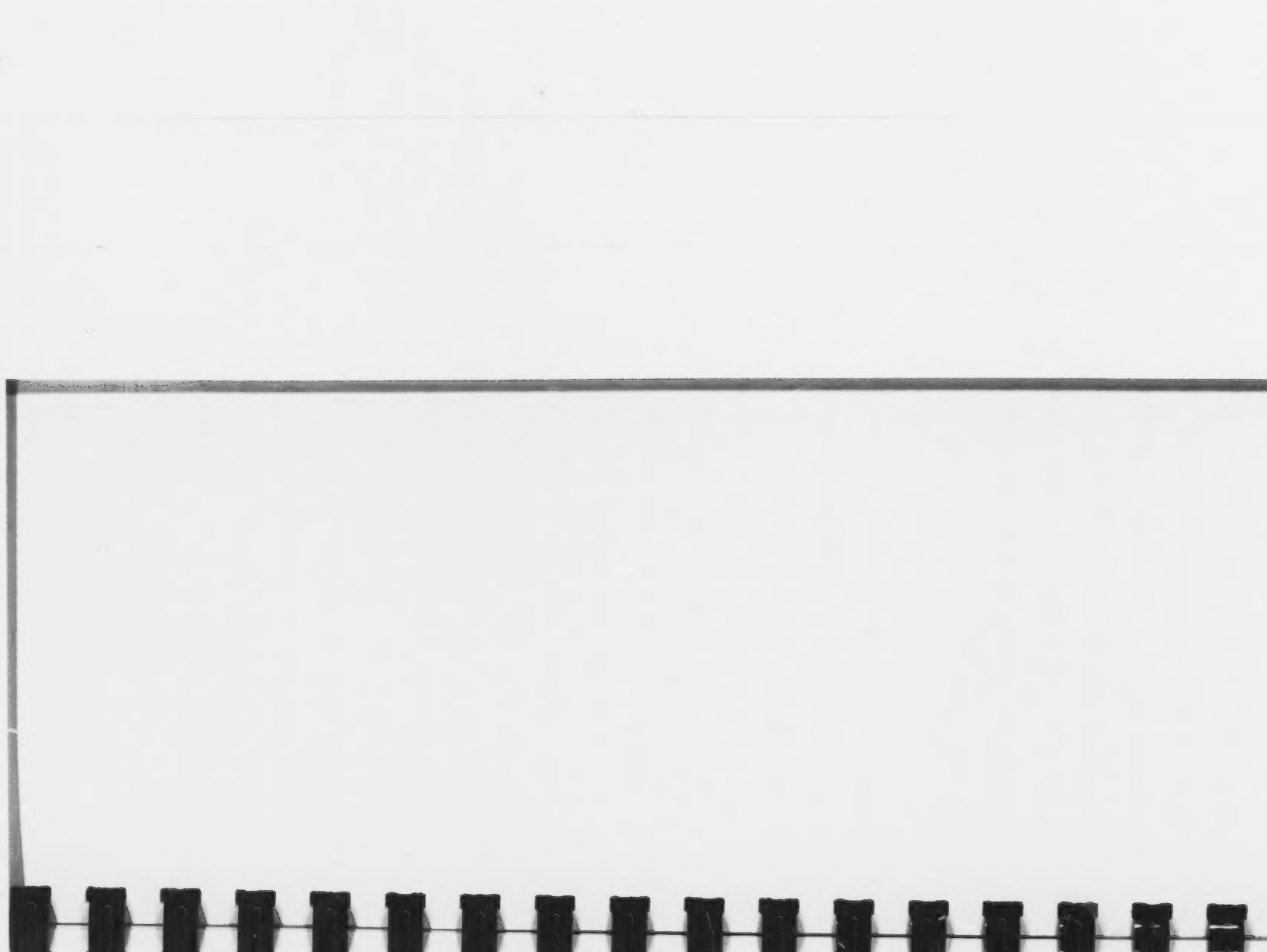
15. The Hatch patent specification discloses the additional subject matter of a "closure strip" that holds the metal primary sealing surfaces in assembled relation for handling, shipping and installation. The specification indicates that the closure strip may be formed from a cellulose band of a type that swells when wet, is applied wet and upon drying shrinks so that a

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tight fit is achieved. It is specified, however, that other functional material may be used for the closure strip. The closure strip is included in claims 3 and 4, although the claims are not directed solely to this holding tape. The cellulose band was stated in the patent to be well known (Col. 4, lines 25-28).

16. In the early days mechanical seal art took the form of wear-resistant, lubricated material packed or stuffed into an enlarged opening, called a "stuffing box," which surrounded the shaft. This material was called a "packing." The constant friction of the shaft against the packing wore the latter and eventually an opening was created through which the fluid being sealed could escape. Stuffing boxes had to be frequently repacked to close such openings. Packing has a further disadvantage in that all packing must leak a little to provide a trickle of lubricant between the packing and the moving surface to reduce friction and wear.

17. In 1961, when the patentees designed the Hatch device, mechanical seals generally consisted of two metal rings in end face abutting relationship and urged into engagement by an axially directed spring force. Seals of this variety consisted of a multiplicity of parts in addition to the pair of metal end face rings, including springs, washers, gaskets, metal shells, and



a rubber sealing diaphragm. They had a relatively short useful life, and were subject to failure if the rubber diaphragm were ruptured. Such rupturing occurred frequently.

18. At the time of the design of the Hatch device, the prior art also included Caterpillar's DuoCone seal. The metal spring and other parts were eliminated, making this a much simpler and more durable seal. (For a more detailed description of this seal see findings 28 and 29.)

Proceedings in the Patent Office
Leading to the Grant of the Patent in Suit

19. The application for the patent in suit, filed November 29, 1961, contained claims numbered 1 through 16. Plaintiff prosecuted the application. On December 5, 1962, Examiner Johnson allowed no claims; claims 1, 6, 8, 9 and 10 were rejected. Following an interview with the examiner by plaintiff's attorney, plaintiff on May 31, 1963 amended the claims and added claim 17. On July 30, 1964, a second examiner, Mr. Downs, again refused to allow any claims; claims 2-5, 7 and 13-16 were held to be withdrawn and claims 1, 6, 8-12 and 17 were rejected.

20. On January 29, 1965, plaintiff cancelled all of the claims then in the case and submitted a new set of claims numbered 18-27. On March 4, 1965, a third examiner, Mr. Rothberg, made a final rejection of all of the new claims 18-27.

21. On June 21, 1965, plaintiff cancelled all of the rejected claims 18-27 and submitted a new set of claims 28-37. In the new set of claims 28-37 the phrase "generally conforming to a parallelogram" was used for the first time to describe the cross-sectional configuration of the secondary sealing member. Plaintiff stated to the examiner that the "new claims . . . emphasize in detail the precise combination of structural features responsible for the many advantages gained from use of applicants' seal." (Emphasis added.) On July 2, 1965, plaintiff filed a supplemental amendment in which all of the claims were amended to specify that the rubber rings are "distortively compressed throughout the entire cross sections thereof."

22. The record does not indicate that patent examiners had before them as references Payne patent 2,855,226 and Durdin patent 1,862,887 at the time claims 1-27 were rejected.

The Prior Art

Payne Patent No. 2,855,226

23. Payne No. 2,855,226 issued to defendant in 1958 on an application filed in 1952. It discloses a rotary mechanical seal that performs the same functions as the Hatch seal and contains a radial-faced metal ring 150 and a "frusto-conical" sealing ring (Belleville washer). Ring 160 fits into an annular recess or seat in metal ring 150. Payne teaches an "incompressible" and "deformable" material for his secondary sealing ring (Col. 3, lines 42-62; Col. 4, lines 3-4). This would include rubber[3/]. In any event, rubber was a commonly used and taught material for the secondary sealing ring in the late 1950's. Selection of rubber for the secondary ring was at that time a mere matter of choice and not of inventive significance.

24. The seat in Payne's metal ring was formed by two surfaces: the axial surface is on a true axis

---

3/ The specification states that one material that fulfills the requirements for the secondary sealing ring is Teflon. Such a chemically inert composition might be required for some of the "special applications" mentioned in the specification, but "ordinary applications" for which incompressible rubber would be satisfactory are also mentioned there.

with the shaft and the radial surface is slanted but the angle is not great.

25. Payne shows a spacer ring 162 to hold the secondary sealing ring in assembled position during installation. The spacer ring holds the parts of the seal together so that the seal can be installed as a cartridge. The spacer ring does not affect the operation of the secondary sealing ring in performing its requisite functions.

26. Payne shows a mechanical leaf spring 148 which provides for force opposing the secondary sealing ring 160.[4/]

Durdin Patent No. 1,862,887

27. Durdin No. 1,862,887 issued in 1932 on an application filed in 1929. The claims of the patent fail to disclose limits on the construction of the device. Figure 1 discloses a double face seal with two metal primary sealing rings and two rubber secondary sealing

---

4/ As indicated below, however, it was old prior to Hatch to make a "double face" seal, i.e., to use a second metal ring and a second rubber ring to provide the opposing force.

rings. Judging from the drawings, the metal rings have right angle seats and the cavity walls have right angle seats. The seat in one metal ring appears to face toward the shaft and the seat in the other metal ring faces away from the shaft.[5/] Durdin's rubber ring has a parallelogram cross-section; however, the rubber rings, when under compression, appear to fill the cavity between the seat and the housing, which means that the cross-section is square. Durdin shows alternative ways of placing the rubber rings under compression, i.e., by a bolt (Fig. 1) or by using a mechanical spring as the opposing force (Fig. 3) as in Payne '226.

Kupfert Patents Nos. 3,073,689
and 2,180,648 and
Caterpillar "DuoCone" Seal

28. Kupfert '689 and Kupfert '648 issued to Caterpillar Tractor Co. in 1963 and 1965, respectively, on an application filed in 1959. Kupfert '689 issued on an application which was divided from the original

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5/ It is noted that the Hatch claims do not call for the placement of the metal rings in the double face seal in mirror image, although the word "pair" is used in describing the rings.

1959 application. The drawings of each of these patents are identical and the descriptions are substantially identical. The drawings in these patents are a fair representation of the structure of the DuoCone seal made and sold by Caterpillar. Caterpillar is a large manufacturer of crawler type tractors and its DuoCone seal has been commercially used in these tractors, both as original equipment and as a replacement part, beginning in 1959. Until plaintiff began to successfully market the seal at issue here, Caterpillar did not sell to or grant licenses to produce to track roller and track vehicle manufacturers. The DuoCone seal is still on the market today but it is apparently used only in Caterpillar's own equipment.

29. The Kupfert patents and the DuoCone seal disclose a double face seal with a pair of metal rings and a pair of rubber rings. The rubber rings are O-rings (torus or doughnut shaped), but they perform the requisite functions of the Hatch secondary sealing rings. In the Kupfert patents and the DuoCone seal the seat-walls in the metal rings are slanted. The same is true of the seat-walls in the housing cavity. This slant in the

seat-wall makes it more expensive to use than the right-angle seat-wall that corresponds with the Hatch seal.

Krug Patent No. 2,289,274

30. Krug Patent No. 2,289,274 issued in 1942 on an application filed in 1939. It shows a single face seal consisting of a single metal ring and a single rubber ring. The rubber ring is of a "frusto-conical" (Belleville washer) shape. The inner portion of the rubber ring 12 is confined in a groove in the periphery of the metal sealing ring 10 and the outer portion in brackets 22-23 in the wall of a housing 13. Krug teaches that the amount of this confinement can be varied "to suit conditions" (p. 2, col. 1, lines 15-26). He leaves it to the man skilled in the art to determine how much confinement is appropriate.

Kupfert Patent No. 2,814,513

31. Kupfert No. 2,814,513 issued to Caterpillar Tractor Co. in 1957 on an application filed in 1955. It shows a single face seal consisting of a metal ring 23 and a rubber ring 26. The rubber ring is of "frusto-conical" shape (Col. 2, lines 60-62).

32. Morley admitted that Hatch et al did not originate or discover the "frusto-conical" (Belleville) rubber ring, the holding tape, the "right angle" seat in the cavity wall -- all of which were old.

33. In order to buttress the presumption of validity, plaintiff relies upon the commercial success its product has enjoyed.[6/]

6/ However, had Caterpillar been willing to sell its DuoCone seal or been willing to license someone else to manufacture and sell such a seal, it seems clear that the need in the industry for a new seal would not have been as great and the demand for plaintiff's product would not have been as high. In fact, the evidence indicates that the success of the Caterpillar seal got plaintiff interested in producing the device at issue here. In short, a major competitor among users of end face seals in track rollers had a very functional patented device which it refused to its competitors. These competitors provide the market for plaintiff's and defendant's products. To substantiate its claim that its device is superior to Caterpillar's seal, plaintiff notes that Caterpillar has offered to sell its DuoCone seal to its competitors and none have chosen to use it. Such evidence is inconclusive, however, since one could infer that if a new device were only on a par with Caterpillar's seal, Caterpillar's competitors would no doubt purchase an acceptable device from others rather than enrich Caterpillar through their purchases. It is noted that Caterpillar continues to use the DuoCone seal.

34. The Payne '226 patent was not cited by the Patent Office and was not called by the patentee to the attention of the Patent Office even though plaintiff was aware of it at the time and expressed concern over it in a letter. The Durdin patent, the Kupfert '513 patent and the Yocum patent '597 were not cited by the Patent Office in the Hatch et al application.

Plaintiff's Alleged Fraud upon the Patent Office

35. Plaintiff was faced with a final rejection of all claims presented after three actions by three different Patent Office Examiners, plus a personal interview with one of the Examiners by plaintiff's attorney and an affidavit by Hatch, one of the co-applicants.

36. At that time, plaintiff was confronted by the Krug 2,289,274 patent cited by the Examiner. To overcome this patent as a prior art reference, plaintiff filed the affidavit of one of the co-applicants, Morley. This affidavit related to comparative tests by Morley of plaintiff's commercial "DF" seal and the "Krug structure" as made up by Morley.

37. The Krug patent shows a single face seal, i.e., a metal ring and rubber ring. The rubber ring is of "frusto-conical" (Belleville washer) shape. The housing for the seal is in the form of an outer ring.

The rubber ring is positioned between the inner and outer rings. The patent specification states that the inner periphery of the rubber ring is held "tightly and snugly" in the channel and the outer periphery is "clamped tightly" in the channel of the outer ring. The patent does not give dimensions for the depth of the channels or the height of the rubber ring, or the distances between the outer edges of the channels in the two rings. The Krug patent drawings are schematic and not to scale. The patent says (p. 2, col. 1, lines 15-23):

> "The amount of axially directed pressure imparted to the inner ring 10 by the disk 12 will of course depend on several factors, such as the thickness of the disk, the distance between the outer edges of the channels in the rings, and the closeness of the fit of the inner and outer peripheries of the disk with the bottom surfaces of the channels, all of which can be varied to suit conditions. A pressure of somewhere between six and ten pounds to the square inch of actual sealing face area will be found to give very good results."

38. Morley made a test model of the Krug structure to compare with plaintiff's "DF" seal. The results of comparative tests are set forth in Morley's affidavit to the Patent Office. The Krug test model

showed deficiencies according to Morley. Defendant contends that Morley made sure of this result by distorting the Krug structure.

39. Morley in his deposition testified that Krug's schematic drawing depicts that 61% radial length of the rubber ring is confined in the channels in the inner and outer metal rings; 39% of the radial length of the rubber ring is unconfined. Morley's affidavit said that the trouble with the Krug structure and the reason for its deficient operation was this confinement of the rubber ring: confinement according to Morley was the material fact.

40. Morley's test model of the Krug patent had 81% confinement of the rubber ring. He thus increased the confinement indicated by the Krug drawing by about 1/3 and reduced the unconfined area by about 1/2 (from 39% to 19%). Instead of telling the Examiner that he had increased the confinement by 1/3 from the patent drawing, he attached to his affidavit a sketch of his Krug test model showing only a 55% confinement. While Morley put the actual dimensions of his test model adjacent to the sketch, unless one made a close comparison of the actual drawing and the dimensions, he could easily be misled to believe that the sketch was a fair representation of the test structure.

41. From the actual dimensions given by Morley of his Krug model the radial distance between the two metal rings can be calculated: it is .061 of an inch. The width of the channels is stated by Morley to be .118 of an inch, and this gives the approximate width or thickness of the rubber ring. Thus, according to Morley's figures his model had a space between the rings of .061" in which he had to push a piece of rubber approximately .118" thick. The thickness of the rubber was almost twice the size of the space. If the rubber could be pushed into the space, it would be mauled and distorted. Plaintiff's expert said he had to use a fingernail file to get the rubber into the space in the model he had made for the trial. Krug, on the other hand, said his rubber ring could be "snapped down" into the channel (p. 1, col. 2, line 44).

42. John Abar, one of the plaintiff's witnesses, testified that with a 31% confinement of Krug's rubber ring, the Krug structure functions satisfactorily.

43. At the trial, plaintiff's expert, Dean Don A. Fischer, testified that he constructed two Krug models conforming to the patent drawings (61% confinement) and that tests of those models indicated they didn't work any better than the 81% confined model.

44. The Morley affidavit to the Patent Office in paragraph 12 stated that the face load range of the Krug seal test model established that Krug would produce "excessive seal face wear with attendant substantial reduction in effective seal life." Plaintiff contends that this was a mere prediction. After the Morley affidavit was filed in the Patent Office, plaintiff concluded a wear test on a Krug model which showed according to plaintiff's patentee Morley an "acceptable" amount of wear during a 502 hour test period. However, leakage developed at some time during the last 72 hours of the test and the test was discontinued. The fact that leakage developed during that time period indicates that the Krug seal is not as durable as the Hatch seal which is the subject of this suit. Plaintiff never reported to the Patent Office this wear test of Krug and defendant contends this amounts to fraud on the Patent Office.

45. A letter written by Hatch, one of plaintiff's patentees, with copies to the other two patentees, dated July 18, 1961, before the application for the patent in suit was filed, states that two prior

Payne patents were "the patents of most concern." The file wrapper of the patent in suit shows that these two Payne patents were never called to the attention of the Patent Office by plaintiff.

Infringement

46. The Hatch seal and defendant's accused seal perform the same function and as demonstrated at trial, are interchangeable in certain track roller installations.

47. The Hatch seal and defendant's accused seal both employ a metal primary sealing ring (one in a single face seal or two in a double face seal). Said rings both have a wall that is perpendicular to the shaft when installed, the outer periphery of which comprises a sealing surface, and an axially directed wall. The primary sealing rings both have an L-shaped cross-sectional configuration, with the inside juncture of the two walls creating a right-angle seat for the secondary sealing ring.

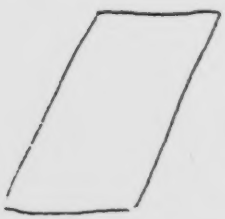
48. The Hatch seal and defendant's accused seal are both marketed with the metal primary sealing rings held together in assembled relation by a cellulose

closure strip. In both instances the closure strip facilitates handling, shipping and installation.

49. The Hatch seal and defendant's accused seal both employ a rubber secondary sealing ring which (a) provides axial force that presses the faces of the metal rings together; (b) forms a secondary seal between the metal rings and the cavity walls; and (c) provides torque that holds one metal ring stationary and causes the other ring to rotate.

50. The rubber rings in the Hatch seal and the defendant's accused seal differ in cross-sectional appearances as illustrated by the following diagrams:

Hatch



Accused Device



The above diagrams show that there is substantial similarity of appearance in the two rubber rings. The ring in the accused device has two "lips," one at the bottom left corner and the other at the top right corner. Absent such "lips," the member would be a "frusto-conical" or Belleville rubber ring.

51. When installed, the rubber ring in the Hatch device is under compression. The ring in the accused seal, because of the presence of the "lips," undergoes both compression and tension. However, when confined in the installed position both rubber rings tend toward a vertical position. In spite of the fact that when the rubber ring of the accused device is under confinement it tends to rest upon the "lips," the action is much closer to that of the Hatch ring than that of the torus ring of the Caterpillar DuoCone seal.

B.

The Court has jurisdiction over the parties and subject matter of this action. Venue is proper in this district.

On the question of validity, plaintiff is of course entitled to a presumption that the Hatch patent is valid. 35 U.S.C. §282. To overcome that presumption there must be clear and convincing evidence of invalidity. Reese v.

Elkhart Welding & Boiler Works, Inc., 447 F.2d 517, 527 (7th Cir. 1971). However, in light of the fact that a patent involves the granting of a monopoly and operates to take knowledge from the public domain, presumptions must not stand in the way of close scrutiny. As stated in Graham v. John Deere Co., 383 U.S. 1, 6 (1966):

> "[i]nnovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must 'promote the Progress of . . . useful Arts.' This is the standard expressed in the Constitution and it may not be ignored."

The defendant contends that the Hatch patent is invalid because it was anticipated by the prior art. The anticipation defense arises out of 35 U.S.C. §102(a), which in essence requires that a device be novel in order to be patentable. Anticipation may exist where insubstantial differences between a purported invention and prior art are present. Popeil Bros. Inc. v. Schick Elec. Inc., 73-1050 (7th Cir. March 21, 1974), but the elements of the purported invention and prior art must be the same, be united in the same way, and perform identical functions. Shelco, Inc. v. Dow Chemical Co., 466 F.2d 613, 614 (7th Cir. 1972). Examination of the Hatch patent in light of the prior art convinces the

Court that it was not anticipated.

Defendant contends that the Hatch claims are anticipated by Payne patent No. 2,855,226; Durdin patent No. 1,862,887; and Kupfert patent No. 3,073,689. With respect to Payne '226, defendant focuses too narrowly on common elements, without regard to the manner in which these elements are united or function. Payne '226 has many more parts than the Hatch device and is more complicated in operation. For example, the rubber ring in Hatch provides both secondary sealing and the spring action, whereas Payne requires a leaf spring to perform the latter function. In light of the presumption of validity, there is sufficient evidence of novelty on which to conclude that Hatch was not anticipated by Payne '226.

The claims and specifications of Durdin '887 are lacking in specificity to such a degree that it is difficult to determine the scope of the invention. For example, the configuration of the metal primary sealing rings is not discernible from the claims or specifications. Judging from the drawings, it would appear that the sides of the metal rings are formed to provide a right angle seat for the "resilient sealing rings" and in this sense

it would be similar to the Hatch device. These secondary sealing rings appear, however, to fill the entire area between the metal ring and the housing wall. Furthermore, the rings are not in mirror image in the drawings as they appear to be in the drawings of the Hatch et al patent. Thus, there appear to be some differences between the two devices and the Court finds that defendant has failed to meet its burden on anticipation with respect to Durdin '887.

Kupfert '689 is probably the prior art teaching that comes closest to the Hatch patent. Aside from insubstantial differences, however, there must be identity of the structures in order to find anticipation. The slanted shape of the seat on the metal rings and the corresponding seat on the housing wall is not insubstantial. Whether or not there was an invention involved in this difference will be considered below, but the Court finds novelty sufficient to defeat the anticipation defense.

The defendant also contends that the Hatch patent is invalid because it was obvious. The test for determining whether a purported invention is obvious is contained in Graham, supra, at 17:

> "Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined."

In Popeil, supra, at 9 (slip opinion), the Seventh Circuit stated that the inventiveness requirement of §103 is

> "less stringent than the substantial identity between prior art and the purported invention which is required to find anticipation. Thus, prior art which is insufficiently similar to anticipate a purported invention may still render it obvious."

In broad terms it appears that the prior art can be divided into three categories: (1) the use of a stuffing box which is packed with wear resistant material (Finding 16); (2) the cartridge-type rotary mechanical seal -- such as Payne '226 -- which involves a multiplicity of parts and metal springs that provide the axial pressure (Finding 17); and (3) the seals that involve only the metal primary sealing rings and the rubber secondary sealing rings -- such as the DuoCone seal (Kupfert '689 and '648). Seals in the latter two

categories each marked a substantial improvement over the prior art in terms of reliability and endurance. The seals in the third grouping have the added advantage of greater simplicity. When viewed in this broader context, the Hatch patent clearly falls in the third category.

More detailed examination of the prior art discloses several of the elements that are contained in the Hatch patent. The Krug patent '274 teaches the use of a rubber ring of a frusto-conical shape. That rubber ring is confined at both ends, but other devices teach unconfined secondary sealing members. Mr. Richard W. Blair, one of the patentees of the Hatch device, admitted at trial that he and his colleagues did not originate the use of a Belleville rubber washer in a seal. It was also admitted that the cellulose cloture strip was not new, although plaintiff contends that unitizing the metal primary rings with such a strip is a new application. Durdin '887 utilized primary sealing rings, which are made of metal and which form a right angle seat for the secondary sealing ring.

In short, comparison of the Hatch device with the prior art reveals that the basic elements are not new, although they may be united in a slightly different fashion.

Determining the level of ordinary skill in the pertinent art, like attempts at establishing other hypothetical standards, poses difficulty. In an apparent attempt to prove that the level of skill was such that the design and manufacture of the Hatch device was difficult to achieve, plaintiff introduced evidence regarding the training and experience of the patentees and the tests they made that were part of the development process. It also introduced evidence that Crane tried unsuccessfully to market its "Single J" design of a rubber loaded face seal and to develop an alternative to the DuoCone seal for which Caterpillar refused to grant a license. One can conclude from the evidence that both Chicago Rawhide and Crane saw the advantages of the DuoCone seal and sought to produce a competitive device. In determining the levels of skill, the DuoCone seal thus provides an important basis for inference; the inference being clearly that the level of skill was quite high at the time of the purported invention of the Hatch device.

In Graham, supra, at 17-18, the Supreme Court stated that the commercial success of a device could be taken into account in determining obviousness. It is

only a secondary consideration, however. As noted in footnote 6, supra, the commercial success of the Hatch device adds little to plaintiff's case, since its commercial success can be characterized as artificially high due to Caterpillar's withholding of its DuoCone seal from the market.

Based on the foregoing, the Court concludes that the Hatch patent is lacking in the inventiveness required by §103 and is therefore invalid by reason of its obviousness. This finding is based on clear and convincing evidence of obviousness. The Court therefore finds it unnecessary to determine whether Payne '226 was adequately brought to the patent examiner's attention.[7/]

The defendant also contends that the Hatch patent is invalid because of indefiniteness. See 35 U.S.C. §112. That section requires that a patent claim particularly point out and distinctly claim the invention. Defendant contends that the Hatch patent is deficient in that there are no stated limits as to (1) the slant of the seat-walls on the metal rings or (2) the shape of the rubber ring.

7/ Defendant relies heavily on this prior art patent which allegedly was not made known to the Patent Office during prosecution of the Hatch application. This reliance was in order to avoid the presumption of validity. Because the Court finds clear and convincing evidence of invalidity, the presumption is of no effect.

The statute requires that a patent be definite so that those with ordinary skill in the art will be able to understand its limits. Definite claims afford greater protection to the patentee and assure that the subject matter will ultimately be dedicated to the public. General Electric Co. v. Wabash Appliance Co., 304 U.S. 364, 369 (1938).

To begin with, the Court notes that Mr. Harry Tankus, a witness for the defendant, testified that upon reading the Hatch patent he had no problem understanding the language of the patent or the construction of the device.

The claims describe the primary metal sealing ring as having

> "A radial outer end face sealing surface for positioning freely about a shaft, a periphery of said sealing ring axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions . . . , said surface portions defining therebetween a rearwardly opening seat. . . ."

Defendant's contention that the claims provide that the vertical and horizontal surfaces forming the seat can be inclined or slanted is unfounded. No reference is made to any incline or slant with respect to the walls

of the primary ring.[8/] Defendant does not contend that the shaft is positioned in any other than a perpendicular relationship to the housing and the Court takes this to be true. This being the case, divergent surfaces in radial and axial direction would form a right angle. This description is definite enough to instruct a person with ordinary skill in the art as to the construction of the device. The fact that the divergent surfaces are defined as "generally axially and radially directed" (emphasis added) does not make the claims fatally defective. Cf. Walt Disney Prods. v. Fred A. Niles Communication Center, 253 F.Supp. 1, 9 (N.D.Ill.), aff'd in part, rev'd in part (7th Cir. 1966).

Furthermore, the specification of the Hatch patent states that the metal rings "are of generally L-shape and each ring is formed with a single angled outwardly facing recess defined by a radial wall surface 26 and an axial wall surface 27."

8/ The only reference to an inclined side in the claims is with regard to the side surface of the rubber secondary sealing member.

Defendant's contention that the patent is invalid in that no limits are given for the shape of the rubber ring arises out of the statement in the specification that the invention includes secondary sealing members of shapes other than true "frusto-conical" shape. The specification then states that any secondary sealing member that provides the requisite functions comes within the invention. The claims cannot describe a device in terms of function. General Electric Co., supra, at 370-71.

The contention fails in light of the amendments to the claims.[9/] Claim 1, which is representative of the other claims, states that the rubber member is "in the form of a ring provided with an effective frusto-conical shape," whose cross-section configuration generally conforms to a parallelogram.

The Court finds that this description is sufficiently definite that those with ordinary skill in the art will be able to understand its limits.

Defendant argues that plaintiff committed fraud upon the Patent Office and that by reason thereof the

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9/ It appears that the specifications and drawings remained essentially unchanged from their original form, while the claims were amended.

patent is invalid and unenforceable and defendant is entitled to attorneys fees. Three separate charges of fraud are made: (1) the Morley affidavit misrepresented that (a) the test structure of the Krug device was equivalent to the Krug patent and (b) that it did not work satisfactorily; (2) plaintiff never reported the result of tests on the Krug device which showed acceptable wear, said test results having become available after submission of the Morley affidavit, the affidavit having stated the Krug would produce "excessive sealing face wear with attendant substantial reduction in effective seal life" (para. 12); and (3) the plaintiff failed to disclose to the Patent Office the prior art Payne patents Nos. 2,855,226 and 2,872,220.

Defendant has to prove the charges of fraud and/or unclean hands by clear, unequivocal and convincing evidence. Scott Paper Co. v. Fort Howard Paper Co., 432 F.2d 1198 (7th Cir. 1970), cert. denied, 401 U.S. 913 (1971). The elements of fraud include: (1) representation of a material fact; (2) falsity of said representation; (3) intent to deceive or recklessness as to the result so that scienter can be inferred; (4) reliance upon the misrepresentation by the party

deceived; and (5) injury to the deceived party. Norton v. Curtiss, 433 F.2d 779, 793 (CCPA 1970).

Plaintiff's expert, Dean Don A. Fischer, testified at 414 that he was satisfied with the accuracy and propriety of the Morley affidavit. He also stated that the test results and the content of the affidavit were accurate. More importantly, Fischer testified that, in his opinion, if the Krug device were made in accordance with the Krug drawings, it still would not have worked.[10/] The only ground on which to support the first charge of fraud is that the sketch of the test device did not correspond to the actual dimensions of the test model.

The dimensions of the test model did accompany the affidavit, however. The charge must also be considered in light of the fact that the Krug patent does not give dimensions and the drawings are not working drawings. Furthermore, the patent states that the amount of axial pressure varies according to the mode of construction. In short, there is allowance for variations which would affect the workability of the device. Because

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10/ Abar testified that a "Krug" device with 31% confinement would work, but it is not contended that such a percentage of confinement was taught by Krug.

no dimensions are given in the Krug patent and because variations are contemplated, it is difficult to determine how the Krug device should actually be constructed. A finding that Morley misrepresented that the test model was equivalent to the Krug patent and that this amounted to fraud would require more definite standards for the Krug device. Inconsistency between the dimensions of the test device and the drawings in the Morley affidavit does not fill this void and by itself does not support the charges.

Furthermore, to find fraud there must be reliance upon the misrepresentation. Since the Krug patent provides for variations in construction and states that such variations would determine the amount of axial pressure, the Court is reluctant to base a finding of fraud on an inference that the patent examiner relied on tests involving only one device. It would appear that several test devices with varying axial pressure would have to be compared before reliance could be placed on the results. Finally, the statement in the affidavit that the test structure did not work must be considered in light of Fischer's testimony that even if made according to the Krug drawings, it would not have worked.

Defendant's charge that plaintiff wrongfully withheld results of a test showing "acceptable" wear must be considered in relation to the far greater endurance of the Hatch device. The scienter required for a finding of fraud was not sufficiently proven with respect to this charge.

The remaining charge of fraud revolves around plaintiff's failure to disclose to the Patent Office the existence of Payne Patents Nos. 2,855,226 and 2,872,220. In an interoffice communication dated July 18, 1961, Mr. Hatch, one of the patentees, stated that in his estimation these two patents were of "most concern" among several patents under discussion (see Finding 46). The reason for this concern was that the patents teach the use of a mating ring supported on a frusto-conical sealing member.

Needless to say, the applicant for a patent has a duty to disclose information that bears on the patentability of his purported invention. Cf. Precision Instrument Mfg. Co. v. Automotive Maintenance Mach. Co., 324 U.S. 806, 818 (1945). The Court notes, however, that the Patent Office was aware of Payne Patent No. 2,871,039. In fact, a patent examiner rejected original claims 1, 6,

8, 9 and 10 on the basis of Payne '039 for the reasons mentioned in the Hatch interoffice correspondence.

Having found the Hatch patent invalid on the ground of obviousness, the alleged fraud or inequitable conduct is relevant only to whether this is an exceptional case that would justify awarding attorney's fees to the defendant. See 35 U.S.C. §285. The awarding of attorneys fees in exceptional cases is apparently done on the theory that a public service is performed by one who succeeds in invalidating an unlawful patent and that one who obtained a patent through wrongdoing deserves punishment. Monolith Portland Midwest Co. v. Kaiser Aluminum & Chem. Corp., 407 F.2d 288, 294 (9th Cir. 1969). The conduct need not reach the level of fraud in order for the case to be considered exceptional. Id. at 294.

The Court considers this a close case. The failure to disclose relevant prior art of which a patent applicant is aware certainly cannot be condoned. Such conduct does not amount to fraud, however, particularly when the Patent Office is aware of one of a family of patents to which the undisclosed patents belong. Scienter is harder to find under such circumstances. Granted that

fraud is unnecessary, it appears that where there has been a finding that the case is exceptional, there are cumulative acts of wrongdoing, Shelco, Inc. v. Dow Chemical Co., 322 F.Supp. 485, 512-16 (N.D.Ill. 1970), aff'd, 466 F.2d 613 (7th Cir. 1972), and that there is reluctance to make such a finding when there is an isolated act, Monolith Portland Midwest Co., supra at 295. Based on the foregoing, the Court concludes that this is not an exceptional case justifying the award of attorneys fees.

Having found the patent to be invalid, there can be no infringement.[11/] However, were the Hatch patent valid, the Crane seal would have infringed it. The test for infringement is summarized in Reese v. Elkhart Welding & Boiler Works, Inc., 447 F.2d 517, 527 (7th Cir. 1971) as follows:

> "Infringement exists if the accused device is the structural equivalent of the device described in a patent, and performs substantially the same function, in substantially the same way, to achieve the same results, even though it differs in form or shape. Union Paper Bag Mach. Co. v. Murphy, 97 U.S. 120, 125, 24 L.Ed. 935 (1878)."

11/ The finding of invalidity also disposes of plaintiff's contention that it was entitled to attorneys fees because of the deliberate nature of the infringement.

There is no question that the Hatch device and the Crane seal perform substantially the same function. Dean Fischer testified that the Crane seal incorporated each feature of the claims of the patent. Defendant has argued that a patent holder who has narrowed its claims to obtain the patent cannot broaden the claims in order to find infringement by others. This argument has to do with the cross-sectional shape of the rubber secondary sealing member. The Hatch claims state that the cross-sectional shape generally conforms to a parallelogram. The Court is not persuaded that the slight change of shape when the Hatch rubber member is under compression destroys the generally parallelogram shape since the sides created are so relatively short. The Court is convinced that the Crane rubber secondary sealing ring infringes. Some difference in form or shape is permissible. See Reese, supra. Furthermore, the addition of the lips in the Crane seal does not detract from the fact that the overall cross-sectional shape of that element is in the nature of a parallelogram and that it closely approximates a frusto-conical shape.

To avoid a finding of infringement defendant emphasizes that the mode of operation of the allegedly

infringing device must be substantially the same. Electric Protection Co. v. American Bank Protection Co., 184 F. 916, 923 (8th Cir. 1910); 7 Deller's Walker on Patents §578 at 409-10 (2d ed. 1972). Aside from the slight tension created when the Crane rubber member is in operative mounting, it is essentially under compression and it tends to go to a vertical position as in the Hatch device. In short, the mode of operation of the two devices is not substantially different. Indeed, the accused device can be substituted for a patented device of like size. Based on the foregoing, the Court finds that the Crane seal would have infringed the Hatch patent were the latter valid.

Judgment will be entered for defendant and the complaint and counterclaim will be dismissed. Each side shall bear its own costs and attorneys fees.

IT IS SO ORDERED.

ENTERED: R W McLaren

United States District Judge

DATED: April 29, 1974

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

RECEIVED
JUN 21 1974
WETZEL, GREENAWALT & FITZGIBBON

CHICAGO RAWHIDE MFG. CO., Plaintiff,	)	
v.	)	No. 72 C 658
CRANE PACKING CO., Defendant.	)	

MEMORANDUM OPINION AND ORDER

This matter is before the Court on plaintiff's motions for a partial new trial for the purpose of oral argument, for amendment and supplementation of the Court's findings of fact as contained in its opinion dated April 29, 1974, and for entry of judgment in its favor. Except for a minor correction of one finding, the motions are denied.

Following completion of the trial, both sides submitted extensive briefs in support of their respective proposed findings of facts and conclusions of law. Plaintiff has submitted additional briefs at this time. In light of these opportunities to argue the law as it pertains to this case and in light of the additional

experience that this Court has had in patent litigation since the trial of this matter, further argument is unnecessary and the motion for a partial new trial is denied.

Plaintiff has proposed various amendments to the Court's factual findings. Proposed amendment 8 deals with Finding 42 and would correct an error in identifying Mr. John Abar as plaintiff's witness, when he in fact testified on behalf of defendant. Accordingly, line 1 of Finding 42 is amended to substitute the word "defendant's" for the word "plaintiff's."

In plaintiff's memorandum in support of its Rule 59(a) and 60(b) motions it is stated at pp. 3-4 that the Court's findings of fact demonstrate "the Court's fine understanding of the facts presented at trial." It is further stated that although the proposed amendments were desirable, not all were critical to the legal issues presented for reconsideration. A motion for reconsideration is not the time to generally reopen findings for minor changes. Only one finding appears to be of real significance -- footnote 6 at p. 21 of the opinion -- and the Court's attention will be directed thereto.

Footnote 6 relates to the commercial success that plaintiff experienced in the sale of its seal. Plaintiff argues that this success is evidence that the device was not obvious. Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966). Footnote 6 stated the conclusion that plaintiff's success was artificially high due to Caterpillar's refusal to sell its DuoCone seal. This conclusion was based on evidence that the DuoCone seal is very similar to plaintiff's device, that various manufacturers desired to purchase the DuoCone seal, and that Caterpillar refused to sell it.

In Graham, the Supreme Court stated that commercial success, long elt but unresolved need, and failure of others "might be used to give light to the circumstances surrounding the origin of the subject matte- sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy." (Emphasis added.) This language indicates that commercial success is not to be given weight automatically. Because of Caterpillar's refusal to sell its DuoCone seal, this case is one in which commercial success has a peculiarly limited significance and thus fails to benefit the party seeking to uphold patent validity.[1/]

1/ Plaintiff urges that Footnote 6 is incorrect in that its device is based on a concept that differs from the DuoCone seal. The evidence fails to support this contention.

With the exception of proposed amendment 8, plaintiff's motion for amendment of the factual findings is denied.

Plaintiff contends that the Court's reliance on Popeil Brothers, Inc. v. Schick Electric, Inc., 494 F.2d 162 (7th Cir. 1974), with respect to the law of obviousness was misplaced since the Seventh Circuit had found the patent invalid for anticipation and other aspects of the opinion are dicta. The proposition for which this Court cited Popeil is that prior art may render a purported invention obvious, although the same prior art would not be grounds for finding anticipation. This is a well-established legal doctrine, Illinois Tool Works, Inc. v. Sweetheart Plastics, Inc., 436 F.2d 1180, 1183 (7th Cir. 1971); Amphenol Corp. v. General Time Corp., 397 F.2d 431, 437-38 (7th Cir. 1968), and citing the most recent case stating that doctrine -- although the statement was dicta -- does not rise to the level of error requiring oral argument or modification of the judgment.

Plaintiff also contends that "[t]he Court's determination of scope and content of the prior art was made inconsistently and in error." The Court takes

this opportunity to emphasize that the Hatch device closely resembles the DuoCone seal -- both contain only the metal primary sealing rings and the rubber secondary sealing rings, with the latter providing the axial pressure. Plaintiff attempted to distinguish its device by pointing out that it had a right angle seat for the secondary sealing ring and that said sealing ring had a frusto-conical shape. In response, it was noted at page 34 of the opinion that Krug patent '274 teaches the use of a rubber ring of a frusto-conical shape and that Durden patent '887 had a metal primary sealing ring with a right angle seat. The DuoCone seal -- Kupfert patent '689 and '648 -- clearly falls in the prior art. Because the claimed differences between the DuoCone seal and the Hatch seal could be found in the prior art, the Court found the patent invalid on the ground of obviousness.

Plaintiff takes exception to the manner in which the Court determined ordinary skill as required by §103 and places reliance on Ransburg Elec. Coating Corp. v. Nordson Corp., 293 F.Supp. 448, 483 (N.D.Ill. 1968) and Malsbary Mfg. Co. v. Ald, Inc., 447 F.2d 809 (7th Cir. 1971). These opinions are not particularly helpful, however.

Malsbary merely suggests at 811 that reliance be placed on the "subjective reaction of a person thoroughly familiar with the particular art."

An article by Judge Giles J. Rich, of the United States Court of Customs and Patent Appeals, which plaintiff attached to its brief, praises the opinion in Reeves Instrument Corp. v. Beckman Instruments, Inc., 447 F.2d 263 (9th Cir. 1971) for its treatment of the question of obviousness. In that opinion at 271 it was stated that:

> "[i]t is difficult to set forth any meaningful quantitative evaluation of the level of skill in a given art. Rather, such determination can be made only by an analysis of the problem allegedly solved by the invention and the efforts of others to arrive at a satisfactory solution. In this respect, the Supreme Court has noted that '[s]uch secondary considerations as commercial success, long felt but unresolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.' Graham v. John Deere Co., supra at 17-18, 86 S.Ct. at 694."

The problem allegedly solved was the need for a durable, relatively uncomplicated end face seal for use in track rollers. Plaintiff alleges that there was a need for easy installation as well. When viewing the

efforts of others to arrive at a solution, it would appear that efforts made prior to the time of the purported invention of the Hatch device would have more significance than the fact that defendant expended considerable effort to design around or improve upon the Hatch device. The foregoing analysis would make the DuoCone seal central to the determination of the level of skill and the Court stands by its earlier conclusion, although the conclusion was based on certain inferences.

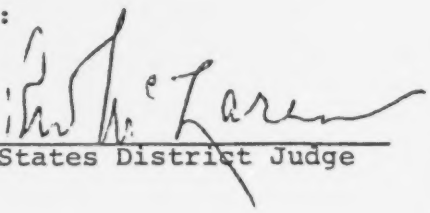
In light of the discussion of footnote 6, nothing more needs to be said regarding commercial success as an indicia of obviousness or nonobviousness. The plaintiff contends that the Court erred in not giving weight to the defendant's "miserable failure" in trying to design around the DuoCone and Hatch seals. Graham, supra. Defendant's attempt to design around the Hatch seal would possibly go to the issue of infringement, but would not buttress the validity of the Hatch seal. Were the Hatch seal significantly different from the DuoCone seal and had others been engaging in research and development aimed at a new seal at the same time Chicago Rawhide was bringing its seal on the market, the

failure of the others would support a finding of nonobviousness. This is not the situation, however.

Based on the foregoing, plaintiff's motion for judgment in its favor is denied.

IT IS SO ORDERED.

ENTERED:



United States District Judge

DATED: June 21, 1974

ATTACHMENT A

March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 1

Fig 1

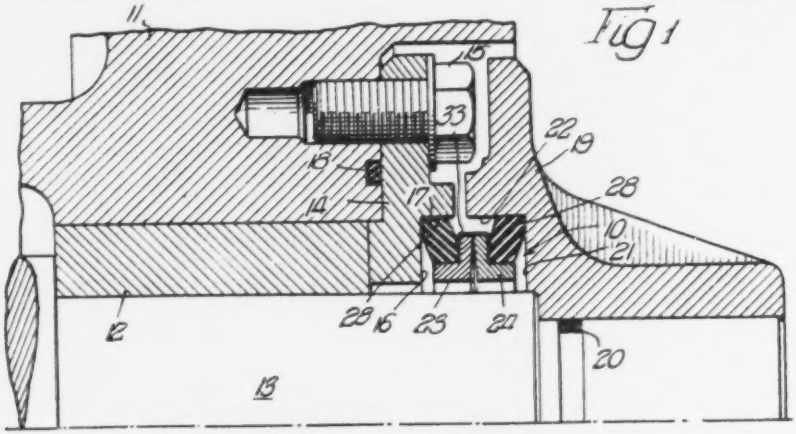


Fig. 2

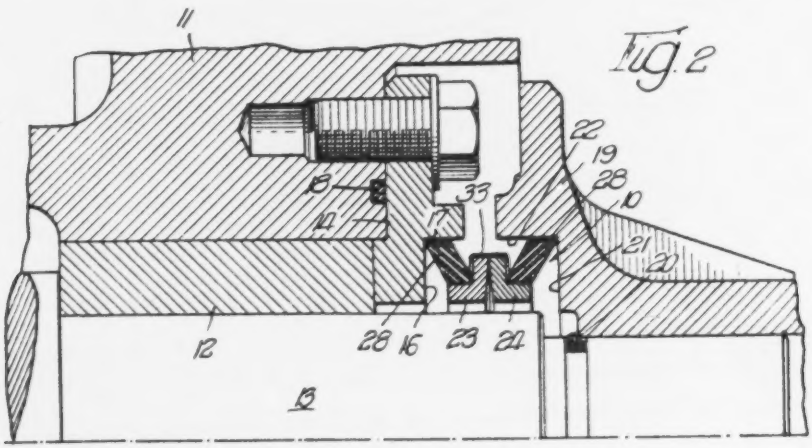
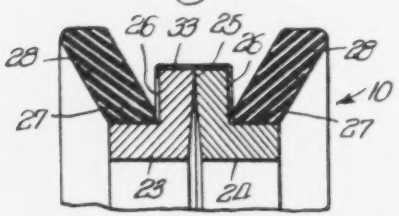


Fig. 3



Inventors:
Seymour A Hatch,
James P Morley,
Richard W Blair,
By Cromwell, Thrust & Warden
Attys

March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 2

Fig. 4

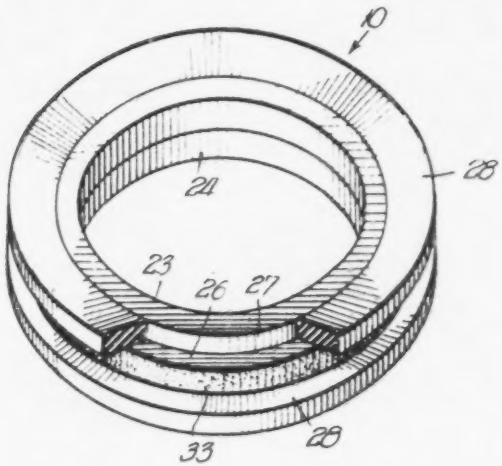
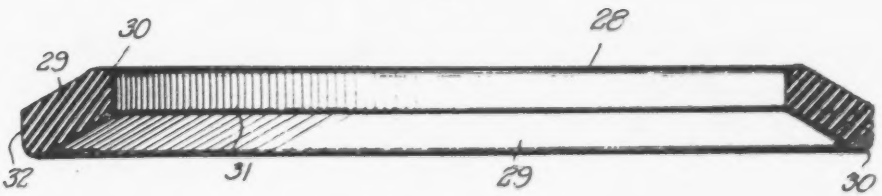


Fig. 5



Inventors:
Seymour A. Hatch,
James P. Morley,
Richard W. Blair,
By Cromwell, Greist & Warden
Attys.

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March 22, 1966 S. A. HATCH ETAL 3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Filed Nov. 29, 1961 3 Sheets-Sheet 3

Fig. 6

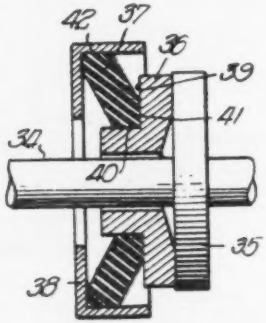


Fig. 7

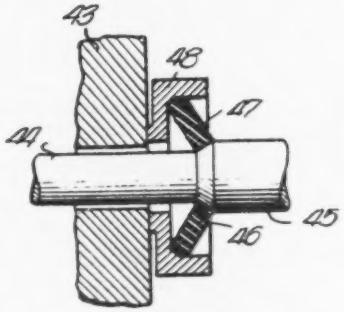


Fig. 8

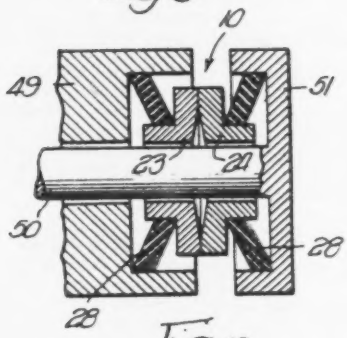


Fig. 9

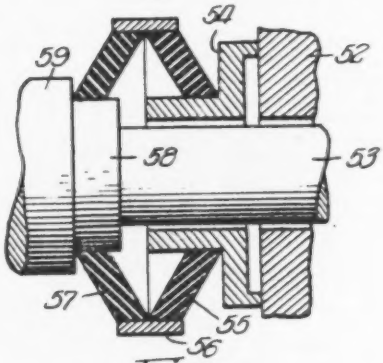


Fig. 10

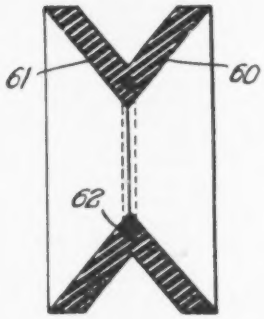
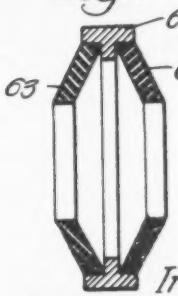


Fig. 11



Inventors:
Seymour A Hatch,
James P Morley,
Richard W Blair,
By Leonard, Bruesch, Waldron
Attys

United States Patent Office

3,241,843

Patented Mar. 22, 1966

3,241,843

COMBINED RING AND FRUSTO-CONICAL MEMBER SEAL ASSEMBLY

Seymour A. Hatch, Forest Park, James P. Morley, Chicago, and Richard W. Blair, Arlington Heights, Ill., assignors to Chicago Rawhide Manufacturing Company, Chicago, Ill., a corporation of Illinois

Filed Nov. 29, 1961, Ser. No. 155,640
10 Claims. (Cl. 277—92)

The invention is directed to a new and improved seal assembly of the general rotary end face type, the invention also being directed to a new and improved installation in which the seal assembly is mounted in a unique operational manner.

There are many known uses for rotary end face seals. Such uses include track roller installations in endless tread tractor units. This particular type of installation is representative of rather extreme requirements for end face seal operational life and efficiency. The seal not only must retain the lubricant but must also continue to function efficiently in the presence of foreign matter such as dirt and the like as well as under extreme weather conditions. Basic rotary end face seal designs have included a sealing ring engaged with a mating ring or mating surface, the sealing ring being provided with spring means acting in an axial direction and maintaining the sealing ring in end face running engagement with the mating surface, axially adjustable sealing ring interlocking means to transmit driving torque to the sealing ring, and secondary sealing means protecting the spring and interlock arrangement from dirt and the like to maintain efficient functioning thereof. Seals of this design are rather complicated, difficult to install, difficult to maintain, expensive, and often unreliable due to the design and operational complexities involved.

Efforts have been made to improve rotary end face seal operation and design. To a certain extent, these efforts have been directed toward the reduction in the total number of parts necessary in end face seal operation. Sealing and mating rings of special configuration have been combined with specially designed secondary sealing members which are intended to provide requisite end face sealing pressure, sealing ring driving torque, and secondary sealing between the ring and a part of the housing or shaft of the installation. The designs resulting from these efforts still leave much to be desired with regard to operational efficiency, economy in fabrication, and ease of installation. In this respect it has been found exceedingly difficult to combine in a single secondary member the various properties necessary to provide the three main and entirely different functions originally performed by three different elements.

It is an object of the present invention to provide a new and improved end face seal assembly and installation including the same, the assembly basically comprising a sealing ring and secondary sealing member which cooperate in a new and improved manner to provide long trouble free and efficient operation while permitting economies in fabrication and installation.

Another object is to provide a new and improved rotary seal formed from a sealing ring and a uniquely designed and positioned secondary compressible sealing member,

the secondary member being of such design and arrangement to provide improvements in seal operation, this secondary member not only being capable of supplying the three essential functions of sealing pressure, seal operational torque, and efficient secondary sealing, but also improving certain aspects and characteristics of these functions.

Still another object is to provide a new and improved seal assembly including as basic parts thereof a sealing ring and mating member and means engaging the sealing ring to hold the same in sealing engagement with the mating member, the assembly being improved by the provision of closure means cooperating with the sealing ring and mating member to maintain assembly thereof prior to and during operational installation of the assembly.

Other objects not specifically set forth will become apparent from the following detailed description of the invention made ino conjunction with the accompanying drawings wherein:

FIG. 1 is a fragmentary half section of a track roller installation illustrating one form of the new and improved seal assembly of the invention in installed operative position;

FIG. 2 is a view similar to FIG. 1 illustrating the installation just prior to completed assembly thereof;

FIG. 3 is an enlarged fragmentary section of the seal assembly used in FIGS. 1 and 2;

FIG. 4 is a fragmentary perspective of the seal assembly;

FIG. 5 is a fragmentary section of one of the secondary sealing members of the assembly;

FIG. 6 is a fragmentary section of a modified end face seal incorporating the improved design features of the invention;

FIG. 7 is a fragmentary section of still another modification of the seal;

FIG. 8 is a fragmentary section of another type of installation in which the seal of the invention is adapted for use;

FIG. 9 is a fragmentary section of another form of the seal illustrating use of a modified secondary sealing member;

FIG. 10 is a sectional view of another form of the basic secondary sealing member of the invention; and

FIG. 11 is a sectional view of still another modified form of secondary sealing member.

Basically, the seal assembly of the present invention comprises a sealing ring engaged by a frusto-conical secondary sealing member which is formed from distortably compressible rubber or rubber-like material. The secondary sealing member is designed and is arranged to engage the sealing ring in the installed condition of the assembly and to apply to the sealing ring radial and axial force components, which radial force component may be of substantial magnitude within a wide range to meet greatly variable driving torque and secondary seal requirements. In the installed condition, the secondary sealing member is compressed in an axial direction. Depending on the rotational speed in a given installation and the type and pressure of the media being sealed, the axial force component defining the sealing face contact pressure of the sealing ring may range from about 5 p.s.i.

to 150 p.s.i. Throughout this range of axial force component, the cooperating radial force component will preferably be at least as great as the axial force component and can be at least as much as 3 times as great even under face loading conditions of 150 p.s.i. This unusually wide range of operational force conditions is due to the particular design and unique structural arrangement of the seal assembly of this invention. In bringing this about, the installed angle of the secondary sealing member will preferably be within the range from about 40° to 90° relative to the center axis of the sealing ring. In general, the secondary sealing member is designed and arranged to be compressed to an extent and into a position relative to the sealing ring whereby an adequate axial force component is applied to the sealing ring for efficient sealing engagement with a mating surface and a sufficient or even very substantially greater radial force component can be applied to the sealing ring for efficient torque transmission thereto through the secondary sealing member. Additionally, there is controlled positioning of the sealing ring during extended operational use thereof, sufficient axial movement of the sealing ring as is required to maintain efficient running engagement with a mating surface is still available, and an efficient secondary seal between the sealing ring and a part of the installation is maintained.

FIGS. 1 and 2 illustrate a typical track roller installation including one form of the seal assembly of the present invention, this particular form being identified by the numeral **10**. The installation includes a track roller **11** mounted on a main bearing **12** for rotation about a shaft **13**. A thrust plate **14** is fixed to the roller **11** by a plurality of fasteners **15** and engages the outer end of the main bearing **12**. The thrust plate **14** is formed with an outer surface annular recess defined by a radial surface **16** and an axial surface **17** which are joined at right angles. A suitable O-ring unit **18** forms a seal between the thrust plate and track roller **11**. The outer end of the roller shaft **13** has mounted thereon a track shaft cap **19** which is suitably fixed on the shaft **13** and which is axially movable outwardly therealong for seal assembly installation. The cap **19** includes suitable fastener means (not shown) to fix the same on the shaft **13**. An O-ring sealing unit **20** is located between the outer reduced end of the shaft **13** and the cap **19**. This cap includes an inwardly opening annular recess portion defined by a radial wall surface **21** joined with an axial wall surface **22** in right angle relation. The seal assembly **10** is mounted about the shaft **13** in spaced relation therewith and is engaged between the thrust plate **14** and cap **19**.

FIGS. 3 and 4 best illustrate the seal assembly **10**. This assembly comprises a pair of cooperating rings **23** and **24** having inner diameters greater than the diameter of the shaft **13**. The rings **23** and **24** are of the same design and each may be considered a sealing ring or one may be considered the sealing ring and the other the mating ring or member. The rings **23** and **24** each include an end face annular sealing surface **25** which as illustrated is located adjacent the outer peripheral edge of the radially directed segment of each ring. These rings are of generally L-shape and each ring is formed with a right angled outwardly facing recess defined by a radial wall surface **26** and an axial wall surface **27**. As shown in FIGS. 1 and 2, the sealing ring surfaces **26** and **27** are arranged relative to the cooperating thrust plate surfaces **16** and **17** and cap surfaces **21** and **22** to geometrically define therewith a generally rectangular secondary seal area.

The secondary seal for each of the sealing rings **23** and **24** is provided by an elastomer **28** of generally frustoconical shape and formed from rubber or rubber-like material which is compressible. FIG. 5 illustrates a preferred form of elastomer **28** which is provided with parallel inclined side surfaces **29** each terminating in a radius **30** at one end thereof and at the opposite end thereof terminating in generally right angled shape by juncture with flat end surface portions **31** and **32**. The geometry of the combined surfaces of the member **28** is such that the member is reversible in that it can be mounted on either of the sealing rings **23** and **24**. With regard to the specific assembly **10**, the flat end surface portion **31** defines the outer diameter of the member **28** and the opposite flat end surface portion **32** defines the inner diameter, this surface portion being mounted against the axial surface **27** of a ring. The convex corners **30** are adapted to be received at the juncture of the right angled surfaces **26** and **27** of a sealing ring, **16** and **17** of the thrust plate **14**, and **21** and **22** of the cap **19**.

Referring particularly to FIGS. 3 and 4, the sealing rings **23** and **24** are held in end face engagement prior to and during installation by a circumferentially arranged strip-like closure means **33** overlying the peripheral mating edges of the sealing surfaces **25** and extending inwardly in overlapping relation along the radial surfaces **26**. The closure strip **33** holds the sealing rings in assembled relation, the secondary sealing member **28** being retained on the sealing rings by reason of frictional engagement with the axial surfaces **27**. The closure strip **33** may be formed from a cellulose band of a type which is well known and sometimes used in establishing a breakable seal between a closure cap and a bottle. The cellulose band is maintained in a suitable solution which causes the cellulosic material to swell, is applied in wet form in overlying relation circumferentially about the rings **23** and **24**, and upon drying shrinks into tight engagement therewith. The band exhibits sufficient strength to hold the rings in assembled condition prior to and during installation to form a complete cartridge-type package for handling, shipping, installation, etc. This band greatly aids in the installation of the complete seal assembly and need not be removed from the assembly following installation thereof. Upon operation of the track roller installation of FIG. 1, the torque transmitted to the sealing ring **23** by the track roller **11** will be sufficient to break the band **33**, the material of this band ultimately being disintegrated in the installation without causing any operational difficulties. Any material capable of providing the functions described may be used in forming the closure band **33**. Furthermore, this particular aspect of the invention is not limited to use solely with the new and improved types of seal assemblies disclosed therein.

FIG. 2 illustrates positioning of the seal assembly **10** in the track roller unit just prior to complete closing thereof and final positioning of the cap **19**. It will be noted that in this condition the seal assembly **10** retains its initial configuration as shown in FIGS. 3 and 4. However, the secondary sealing members **28** are designed so that upon complete closing and final positioning of the cap **19** they become compressively distorted axially toward one another and radially inwardly to a rather substantial degree as illustrated in FIG. 1. Compression to a substantial extent constitutes an important aspect of efficient utilization of the seal assembly of the present invention. The final angularity of the installed secondary sealing members **28** is changed to an extent that radial and axial force components of sufficient relative magnitude are applied against the sealing rings **23** and **24** as well as against the right angled mounting surfaces engaged with the outer diameters of the members **28**. The distortion of the secondary sealing members **28** from their free position to their installed position creates shear and compression forces to supply efficient seal face loading and supply a relatively high contact force for secondary sealing and torque transmission to the sealing ring. By referring to the secondary sealing member being compressed in an axial direction, it is intended to cover the actual distortion which the secondary sealing

member undergoes upon completed installation bearing in mind that technically rubber is not compressible. Such distortion involves the application of a load in an axial direction resulting in a substantial foreshortening or deformation of the secondary sealing member accompanied by radial growth to wedge the secondary sealing member in radially resiliently acting position between the sealing ring and a part of the housing. In this position the secondary sealing member is in shear and compression, the shear condition being primarily responsible for the axial force component developed and the compression condition being primarily responsible for the radial force component developed. It has been found that the forces establishing the secondary seal and torque transmission may be greatly increased by reason of the design of the seal assembly of the present invention while maintaining sealing face loading within an efficiently usable range. Among other advantages, this discovery results in a great simplification of end face seal design and eliminates the use of auxiliary mechanical interlocks as well as secondary seal elements, such as relatively weak or fragile flexible diaphragms, while maintaining efficient, end face sealing thrust. An important aspect of the improvement resides in the utilization of a compressible secondary seal which upon installation is placed in shear as well as compression to provide the new and improved results.

By use of the general frusto-conical shape in forming a compressible secondary sealing member of the type described, it is possible to position one diameter of the secondary member statically on the sealing ring and the other diameter statically on the cooperating part of the installation. This design permits conversion of compressive strains and forces established in the secondary member itself into effectively directed or applied forces at the mating surfaces of the sealing rings, which forces are at least the full equivalent of spring rates in seals normally equipped with auxiliary face loading springs. This unusual conversion of compressive strains and forces may be used to provide the secondary sealing member with a considerably greater static sealing force than the face loading force also supplied thereby wherever desired. In other words, this conversion may be used to maximize the frictional forces existing at the static sealing faces so that a considerable torque may be transmitted by the secondary member. It will be appreciated that variations in axial and radial forces are available in a given installation by mere control of secondary sealing member compressive positioning upon installation thus eliminating the existing practice of substituting springs of different ratings.

It has been found that the installed angularity (angle obtained upon installational compression) should come within the range of from about 40° to 90° relative to the center axis of the sealing ring or installation. With the design described, tests have shown that the radial component of force transmitted to the sealing ring by the secondary member may be controlled to be on the order of as much as 3 times the axial or end face seal loading component of force supplied by the secondary member. This range in force ratio is highly desirable with regard to supplying adequate torque to the sealing member and for the purpose of maintaining efficiently operating static seals at the end surfaces of the secondary member under widely varying operational conditions including high face loading conditions. Within the range of angularity specified, it has been found that any desired ratio of radial and axial force components may be adequately maintained. In this respect, the ratios of radial force component to axial force component may range from 1 to 1 to 3 to 1 over a range of sealing face loading of about 5 p.s.i. to 150 p.s.i.

The seal assembly **10** has been subjected to severe operational tests with surprising results. The right angled surfaces engaged by the secondary sealing members **28** to define static seals were polished smooth and supplied with a coating of grease. Slippage was noted only after the sealing ring surfaces were substantially overloaded and the starting torque applied was so great as to exceed expected operational conditions. Nevertheless, no leakage occurred and the seal continued to perform satisfactorily without being dismantled. As a result of tests it has been found that the secondary sealing members **28** are capable of breaking loose sealing rings which are frozen to mating surfaces at temperatures as low as minus 63° F. without attendant slippage.

FIGS. 6–11 illustrate different forms of seal assemblies and components utilizing the principles of the present invention. The modifications are illustrated in their free condition bearing in mind that upon completed installational mounting the secondary sealing members will become compressed in the manner described above. Furthermore, it will be understood that the specific modifications illustrated are not intended to be limiting but are merely illustrative of various environmental uses of some of the concepts of the invention.

FIG. 6 illustrates an installation including a shaft **34** having fixedly mounted thereon an annular mating plate **35** against which a sealing ring **36** is placed in end face sealing engagement by a frusto-conical secondary sealing member **37** extending between the same and a mounting part **38**. The rear surface of the sealing ring **36** is formed with a radial surface portion **39** joined at right angles with an axial surface portion **40**. The mounting part **38** is of right angle configuration and may constitute a cover plate or the like in a particular installation. The secondary sealing member **37** is formed from compressible elastomeric material and the inner and outer end surfaces **41** and **42** may be of general V-shape for seating at the juncture of the right angle confining surfaces of the sealing ring **36** and mounting part **38**. The secondary sealing member **37** functions in the manner described above to maintain the sealing ring **36** in end face sealing engagement with a mating surface of the member **35**.

FIG. 7 illustrates an installation involving a fixed part **43** receiving through a bore therein a shaft **44**. This shaft is formed with an enlarged portion **45** defining an angled secondary sealing member mounting surface **46**. A frusto-conical secondary sealing member **47** of the type described is mounted between the shoulder **46** and cooperating surface portions of a sealing ring **48** which is in running end face sealing engagement with the outer surface of the fixed part **43**. The cooperating mounting surfaces of the sealing ring **48** which are engaged by the secondary sealing member **47** are not of true right angle configuration but are arranged to adequately fix and hold the outer end of the secondary sealing member **47** in efficiently functioning position. The shoulder **46** of the shaft portion **45** seats the inner end surface of the secondary sealing member **47** for compression thereof in an axial direction to establish and maintain the force components required for operation of the seal. The arrangement illustrated in FIG. 7 is somewhat more complicated due to the use of another type of generated surface **46** which is not a right angle surface of the type previously described. FIG. 7 is illustrative of the advantages of the use of all right angle surfaces as such use does not require the generation of separate multiple or difficult surfaces. Thus another important aspect of the invention resides in the fact that the particular type of secondary sealing member used is especially adapted for mounting against plane and cylindrical surfaces and does not require conical, tapered, inclined, or other specially generated surfaces for efficient operation thereof.

FIG. 8 illustrates use of the assembly **10** previously described in a different type of installation. This installation makes use of a part **49** receiving therethrough a shaft **50**, the shaft being formed at the end thereof with

an integral annular member 51. The member 51 on the inner surface thereof is provided with right angled secondary sealing member mounting surfaces opposed to similar right angled mounting surfaces formed in the outer end of the fixed part 49. Thus, the seal assembly 10 is adapted for mounting in many different types of installations, such installations requiring only slight inexpensive pre-working to accommodate the seal assembly.

The secondary sealing members need not be bonded to the sealing ring or other mounting part in order to perform the improved functions. However, bonding may be relied upon depending upon the particular design needed for a given installation.

FIG. 9 illustrates another type of installation including a part 52 receiving therethrough a shaft 53 about which is mounted a sealing ring 54 in end face sealing engagement with the part 52. The rear face of the sealing ring 54 is formed with right angled surfaces and has engaged herewith a frusto-conical secondary sealing member 55 extending rearwardly and outwardly into outer end face bonded attachment with an annular part 56. This part may be rotatable or fixed depending upon the intended use of the installation. The part 56 has also bonded thereto the outer end surface of another frusto-conical secondary sealing member 57 which extends into engagement with a first shoulder portion 58 of the shaft 53 cooperatively arranged with a second enlarged shoulder portion 59 on the shaft 53. The shoulder portions 58 and 59 cooperatively provide a right angled mounting area for the inner end of the secondary sealing member 57.

FIG. 10 illustrates a modified form of secondary sealing member unit including a generally V arrangement of joined secondary sealing member leg portions 60 and 61. The inner diameter portion of the unit includes an annular metallic ring 62 embedded in the base of the unit to provide adequate strength thereto for utilization of the unit in the same manner as the secondary sealing member unit of FIG. 9.

FIG. 11 illustrates a unit of somewhat similar design including a pair of frusto-conical secondary sealing members 63 and 64 having their outer end surfaces engaged with right angled surface portions of an annular member 65 which is generally in the form of a T. The unit of FIG. 11 does not require bonding of the outer end surfaces of the secondary sealing members 63 and 64 to the annular member 65. The use of multiple secondary sealing members in the manner shown in FIGS. 9–11 is indicative of a "stacking" advantage. Where a very high radial force is required, a pair of secondary sealing members may be used as shown and yet still permit requisite axial "play" or movement of the sealing ring as a result of wear during extended operational use.

While the secondary sealing members illustrated and described herein are termed as "frusto-conical," it will be understood that the invention is of a scope sufficient to include the use of secondary sealing members of shapes other than true "frusto-conical" shape. As long as a secondary sealing member is shaped to permit adequate axial and radial compression thereof in the manner and to the extent described to provide the requisite functions, such a secondary sealing member comes within the scope of this invention.

Obviously certain modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. An end face seal assembly for installation in a shaft assembly, said seal assembly consisting of a sealing ring having a radial outer end face sealing surface for positioning freely about a shaft, a periphery of said sealing ring axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions presenting circumferential continuity, said surface portions defining therebetween a rearwardly opening seat for readily accessible force loading of said sealing ring, and a secondary sealing and driving member formed solely from distortively resilient solid rubber material and in the form of a ring provided with an effective frusto-conical shape removably and solely frictionally and slidably mounted in said seat, the cross-sectional configuration of said secondary sealing member further generally conforming to a parallelogram having radially inclined side surface portions and an end surface portion extending in an axial direction and being in rearwardly unconfined removable frictional and slidable engagement with the axially directed surface portion of said sealing ring seat, said secondary sealing member extending rearwardly from said sealing ring in inclined relation thereto with a leading edge of said end surface portion in abutting but radially unconfined engagement with the radially directed surface portion of said sealing ring seat, said secondary sealing member being adapted for similar axial and radial engagement by the other end surface portion thereof with a part of said shaft assembly spaced radially and rearwardly from said divergent surface portions of said sealing ring for unrestricted axial and radial distortive resilient spring action of said secondary sealing member upon operative mounting of said seal assembly in said shaft assembly, whereby said secondary sealing member is distortively compressed throughout the entire cross section thereof to supply a face loading force to said sealing ring and simultaneously frictionally interlock said sealing ring, secondary sealing member and shaft assembly part, the axially directed surface portion of said sealing ring seat being at least coextensive with said first named end surface portion of said secondary sealing member for unrestricted transmission of loading force to said sealing ring upon operative mounting of said seal assembly.

2. An end face seal assembly for installation in a shaft assembly, said seal assembly comprising a pair of sealing rings each having a radial outer end face sealing surface for positioning freely about a shaft in mutual end face surface sealing engagement, a periphery of each of said sealing rings axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions presenting circumferential continuity, said surface portions defining therebetween a rearwardly opening seat for readily accessible force loading of said sealing rings, and a pair of secondary sealing and driving members formed solely from distortively resilient solid rubber material and each in the form of a ring provided with an effective frusto-conical shape removably and solely frictionally and slidably mounted in said seats, the cross-sectional configuration of each of said secondary sealing members further generally conforming to a parallelogram having radially inclined side surface portions and an end surface portion extending in an axial direction and being in rearwardly unconfined removable frictional and slidable engagement with the axially directed surface portion of a sealing ring seat, said secondary sealing members extending rearwardly from said sealing rings in inclined relation thereto with a leading edge of each of said end surface portions in abutting but radially unconfined engagement with the radially directed surface portion of a sealing ring seat, said secondary sealing members being adapted for similar axial and radial engagement by the other end surface portions thereof with parts of said shaft assembly spaced radially and rearwardly from said divergent surface portions of each of said sealing rings for unrestricted axial and radial distortive resilient spring action of said secondary sealing members upon operative mounting of said seal assembly in said shaft assembly, whereby said secondary sealing members are distortively compressed throughout the entire cross sections thereof to supply a face loading force to each of said sealing rings and simultaneously frictionally inter-

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lock said sealing rings, secondary sealing members and shaft assembly parts, the axially directed surface portions of said sealing ring seats being at least coextensive with said first named end surface portions of said secondary sealing members for unrestricted transmission of loading force to said sealing rings upon operative mounting of said seal assembly.

3. The seal assembly of claim 2 wherein said sealing rings are held in end face sealing surface engagement by pressure and heat disintegratable means applied to adjacent surfaces of said sealing rings on said sealing rings to hold said sealing rings in assembled engagement with said secondary sealing members frictionally mounted in the seats of said sealing rings prior to and initially during installation of said seal assembly in a shaft assembly.

4. The seal assembly of claim 2 wherein said sealing rings are held in end face sealing surface engagement by strip-like closure means overlying the outer periphery of said sealing rings in overlapping engagement therewith to hold said sealing rings in assembled engagement with said secondary sealing members frictionally mounted in the seats of said sealing rings prior to and initially during installation of said seal assembly in a shaft assembly, said strip-like closure means being formed from material which disintegrates upon operational use of said seal assembly.

5. In a shaft installation, the provision of an end face seal assembly comprising a sealing ring having a radial outer end face sealing surface in sealing engagement with a mating surface forming a part of said installation, a periphery of said sealing ring axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions presenting circumferential continuity, said surface portions defining therebetween a rearwardly opening seat for readily accessible force loading of said sealing ring, and a secondary sealing and driving member formed solely from distortively resilient solid rubber material in the form of a ring provided with an effective frusto-conical shape removably and solely frictionally and initially slidably mounted in said seat, the cross-sectional configuration of said secondary sealing member further generally conforming to a parallelogram having radially inclined side surface portions and an end surface portion extending in an axial direction and being in rearwardly unconfined removable frictional and initially slidable engagement with the axially directed surface portion of said sealing ring seat, said secondary sealing member extending rearwardly from said sealing ring in inclined relation thereto with a leading edge of said end surface portion in abutting but radially unconfined engagement with the radially directed surface portion of said sealing ring seat, said secondary sealing member being in similar axial and radial engagement by the other end surface portion thereof with a part of said shaft installation spaced radially and rearwardly from said divergent surface portions of said sealing ring seat and in cooperation with said divergent surface portions placing said secondary sealing member in unrestricted axially and radially distortively compressed condition throughout the entire cross section thereof between said part and said sealing ring, whereby an unrestricted dynamic spring action is established using the entirety of said secondary sealing member to supply a face loading force to said sealing ring and simultaneously frictionally interlock said sealing ring, secondary sealing member and shaft installation part, the axially directed surface portion of said sealing ring seat being at least coextensive with said first named end surface portion of said secondary sealing member for unrestricted transmission of loading force to said sealing ring, said secondary sealing member except for its engagement with said sealing ring and said part being otherwise unconfined within said shaft installation.

6. The seal assembly of claim 5 wherein said shaft installation part includes divergent generally axially and radially directed surface portions defining a seat which is equivalent to but opposed to the seat of said sealing ring, said seat of said part receiving said other end surface portion of said secondary sealing member in removable frictional and initially slidable engagement therewith.

7. The seal assembly of claim 5 wherein the dynamic spring action of said secondary sealing member establishes radial and axial force components applied to said sealing ring at a ratio of from about 1 to 1 to 3 to 1 throughout an axial force component range of from about 5 p.s.i. to 150 p.s.i.

8. In a shaft installation, the provision of an end face seal assembly comprising a pair of sealing rings each having a radial outer end face sealing surface received about a shaft and in mutual end face surface sealing engagement, a periphery of each of said sealing rings axially rearwardly of said sealing surface defining divergent generally axially and radially directed surface portions presenting circumferential continuity, said surface portions defining therebetween a rearwardly opening seat for readily accessible force loading of said sealing rings, and a pair of secondary sealing and driving members formed solely from distortively resilient solid rubber material and each in the form of a ring provided with an effective frusto-conical shape removably and solely frictionally and initially slidably mounted in said seats, the cross-sectional configuration of each of said secondary sealing members further generally conforming to a parallelogram having radially inclined side surface portions and an end surface portion extending in an axial direction and being in rearwardly unconfined removable frictional and initially slidable engagement with the axially directed surface portion of a sealing ring seat, said secondary sealing members extending rearwardly from said sealing rings in inclined relation thereto with a leading edge of each of said end surface portions in abutting but radially unconfined engagement with the radially directed surface portion of a sealing ring seat, said secondary sealing members being in similar axial and radial engagement by the other end surface portion thereof with parts of said shaft installation spaced radially and rearwardly from said divergent surface portions of each of said sealing ring seats with said secondary sealing members being unrestrictively axially and radially distortively compressed throughout the entire cross-sections thereof between said sealing rings and said parts, whereby a dynamic spring action is established using the entirety of said secondary sealing members to supply a face loading force to said sealing rings and simultaneously frictionally interlock said sealing rings, secondary sealing members and shaft installation parts, the axially directed surface portions of said sealing ring seats being at least coextensive with said first named end surface portions of said secondary sealing members for unrestricted transmission of loading force to said sealing rings, each of said secondary sealing members except for its engagement with a sealing ring and a part being otherwise unconfined in said shaft installation.

9. The seal assembly of claim 8 wherein said shaft installation parts each include divergent generally axially and radially directed surface portions defining a seat which is equivalent to but opposed to the seat of an adjacent sealing ring, said seat of each of said parts receiving said other end surface portion of a secondary sealing member in removable frictional and initially slidable engagement therewith.

10. The seal assembly of claim 8 wherein the dynamic spring action of said secondary sealing members establishes radial and axial force components applied to said sealing rings at a ratio of from about 1 to 1 to 3 to 1 throughout an axial force component range of from about 5 p.s.i. to 150 p.s.i.

(References on following page)

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11

References Cited by the Examiner

UNITED STATES PATENTS

2,167,669	8/1939	Molyneux	277—92
2,214,243	9/1940	Casson	277—90
2,289,274	7/1942	Krug	277—42
2,871,039	1/1959	Payne	277—38
2,911,840	11/1959	Muller et al.	277—42 X
3,073,657	1/1963	Oxford.	

12

3,110,097	11/1963	Yocum	277—9 X
3,185,488	5/1965	Christensen et al.	277—42

FOREIGN PATENTS

1,255,283	1/1961	France.

LAVERNE D. GEIGER, *Primary Examiner.*

WALTER A. SCHEEL, EDWARD V. BENHAM, LEWIS J. LENNY, *Examiners.*

CATERPILLAR IM 8747 TRACK ROLLER SEAL

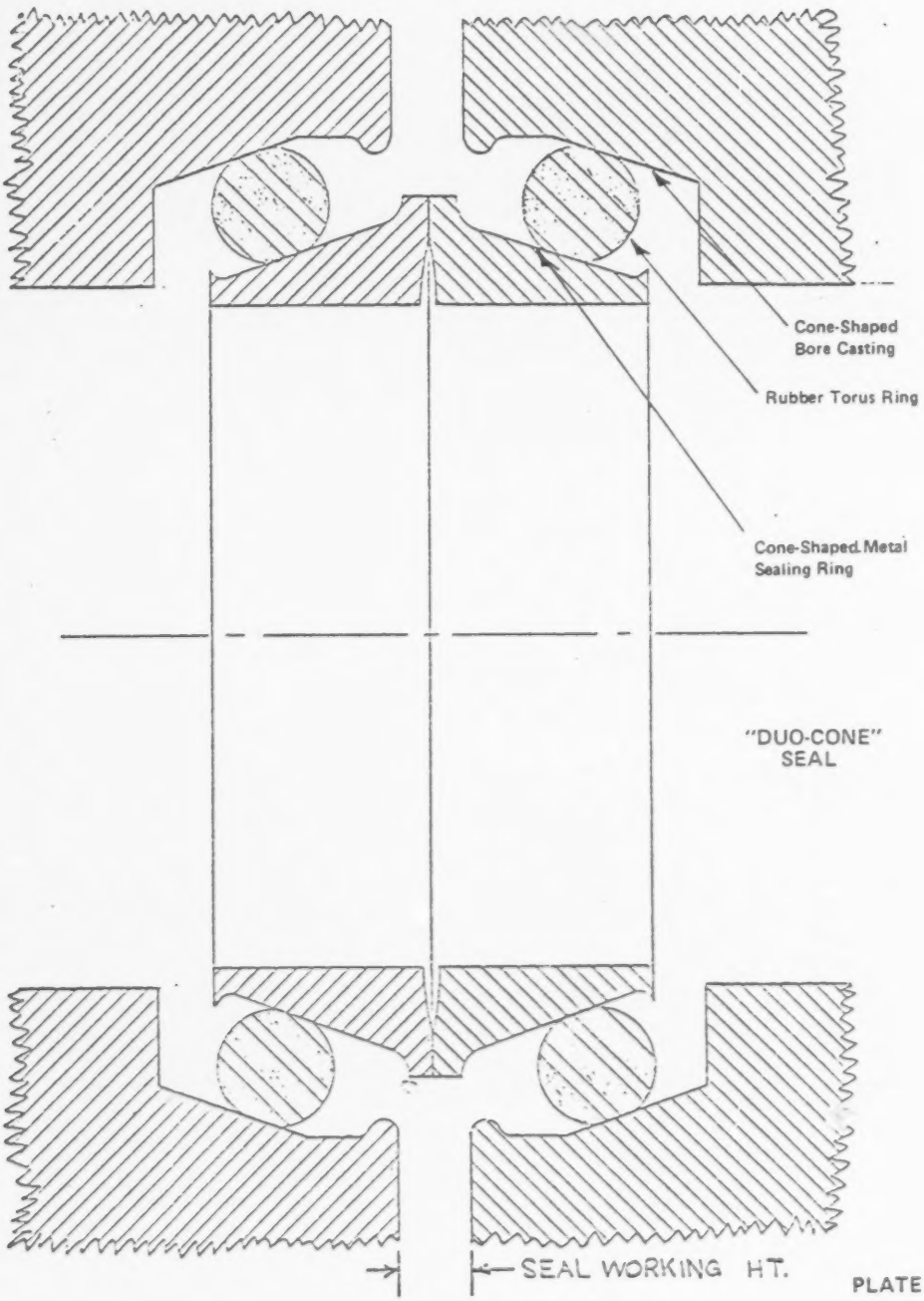


PLATE VIII

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FIG. 2

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